Service
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160E1SB/93
160E1SB/97
160E1SB/00
160E1SB/05
160E1SB/62

Service Manual

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SAFETY NOTICE

ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

CAUTION: USE A SEPARATE ISOLATION TRANSFOMER FOR THIS UNIT WHEN SERVICING

REFER TO BACK COVER FOR IMPORTANT SAFETY GUIDELINES

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飛利浦 PHILIPS

Revision List

Version	Release Date	Revision History
A00	Jan.12.2009	Initial release, Draft Version

Important Safety Notice

Proper service and repair is important to the safe, reliable operation of all Philips Company Equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It is also important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a customer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

Hereafter throughout this manual, Philips Company will be referred to as Philips.

WARNING

Use of substitute replacement parts, which do not have the same, specified safety characteristics, may create shock, fire, or other hazards.

Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design.

Customer assumes all liability.

FOR PRODUCTS CONTAINING LASER:

DANGER- There is invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.

CAUTION-Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION -The use of optical instruments with this product will increase eye hazard.

TO ENSURE THE CONTINUED RELIABILITY OF THIS PRODUCT, USE ONLY ORIGINAL MANUFACTURER'S REPLACEMENT PARTS, WHICH ARE LISTED WITH THEIR PART NUMBERS IN THE PARTS LIST SECTION OF THIS SERVICE MANUAL.

Take care during handling the LCD module with backlight unit

-Must mount the module using mounting holes arranged in four corners.

-Do not press on the panel, edge of the frame strongly or electric shock as this will result in damage to the screen.

-Do not scratch or press on the panel with any sharp objects, such as pencil or pen as this may result in damage to the panel.

-Protect the module from the ESD as it may damage the electronic circuit (C-MOS).

-Make certain that treatment person’s body is grounded through wristband.

-Do not leave the module in high temperature and in areas of high humidity for a long time.

-Avoid contact with water as it may a short circuit within the module.

-If the surface of panel becomes dirty, please wipe it off with a soft material. (Cleaning with a dirty or rough cloth may damage the panel.)

1. Monitor Specifications

1.1 Technical specifications

LCD Panel	
• Type	TFT LCD
• Screen size	15.6” Visual
• Pixel pitch	0.252 x 0.252mm
• LCD Panel type	1366 x 768 pixels
	R.G.B vertical stripe
	Anti-glare polarizer, hard coated
• Effective viewing area	3 4.2 x 193.5 mm
Display Colors	16.7M
Scanning	
• Vertical refresh rate	56 Hz – 76 Hz
• Horizontal Frequency	30 kHz - 60 kHz
Video	
• Video dot rate	140 MHz
• Input impedance	
- Video	75 OHM
- Sync	2.2K OHM
• Input signal levels	0.7Vpp
• Sync input signal	Separate Sync
	Composite Sync
	Sync On Green
• Sync polarities	Positive and Negative

* This data is subject to change without notice.

1.2 Physical specifications

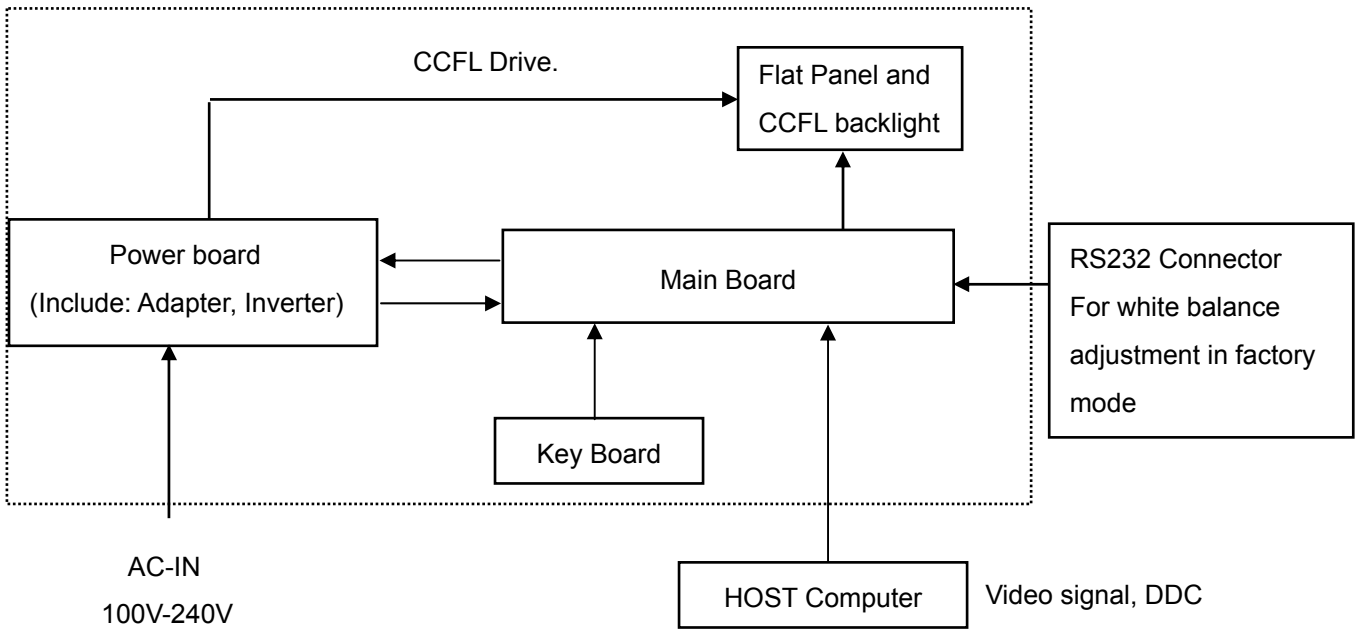
• Tilt	- 5°~ 20°
• Power supply	100~ 240 VAC, 50/60Hz
• Power consumption	<35W *(typ.)
• Temperature	0℃ to 40℃ (operating)
	-20℃ to 60℃ (storage)
• Relative humidity	20% to 80%
• System MTBF	50K hours (CCFL 50K hours)
• Cabinet color	160E1SB: black

2. LCD Monitor Description

The LCD monitor will contain a main board, a power board and a key board which house the flat panel control logic, brightness control logic and DDC.

The power board will provide AC to DC Inverter voltage to drive the backlight of panel and the main board chips each voltage.

Monitor Block Diagram



3. Operating Instructions

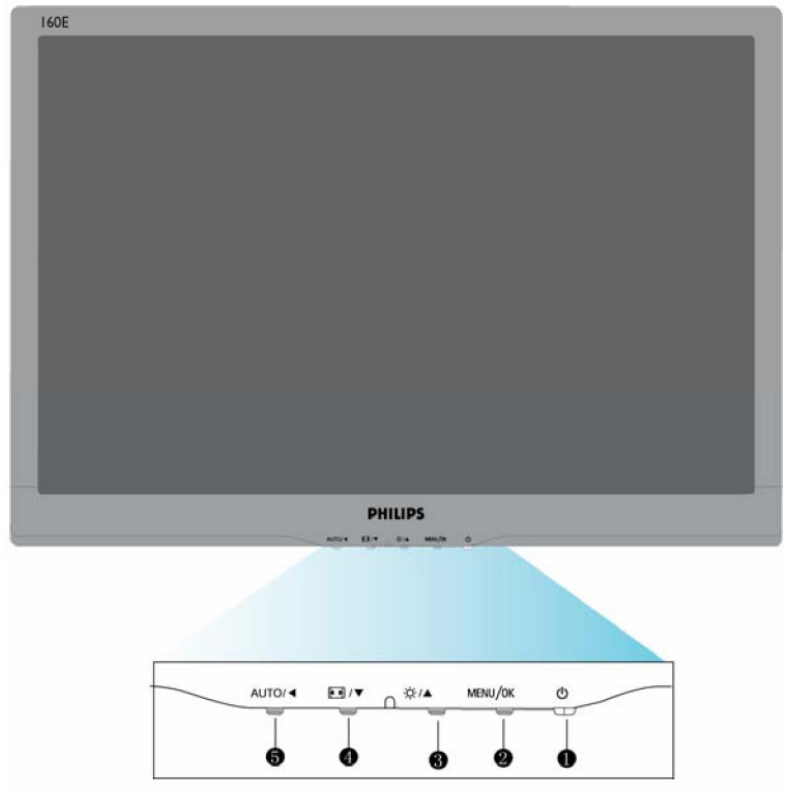
3.1 General Instructions

Press the power button to turn the monitor on or off. The other control knobs are located at front panel of the monitor (see figure). By changing these setting, the picture can be adjusted to your personal preference.

* The power cord should be connected.
* Press the power button to turn on the monitor. The power indicator will light up.

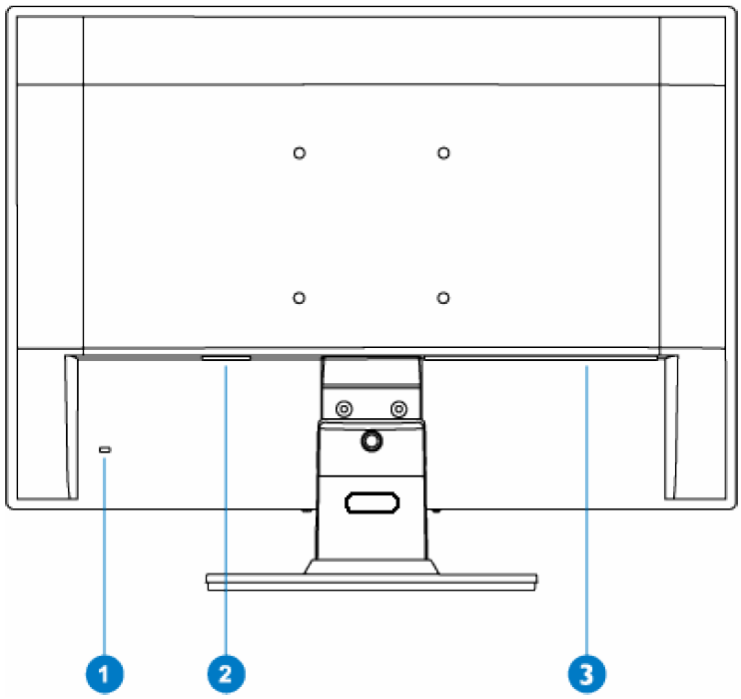
3.2 Control Buttons

Front View



1	⏻	To switch monitor's power on and off
2	**MENU/OK**	To access OSD menu/Confirm
3	☼/▲	To adjust brightness of the display
4	⧈/▼	Auto picture control switching in wide and 4:3 formal
5	**AUTO/◄**	Auto adjust the horizontal position, vertical position, phase and clock settings Return to previous OSD level

Rear View



1 Kensington anti-thief lock

2 AC power input

3 VGA input

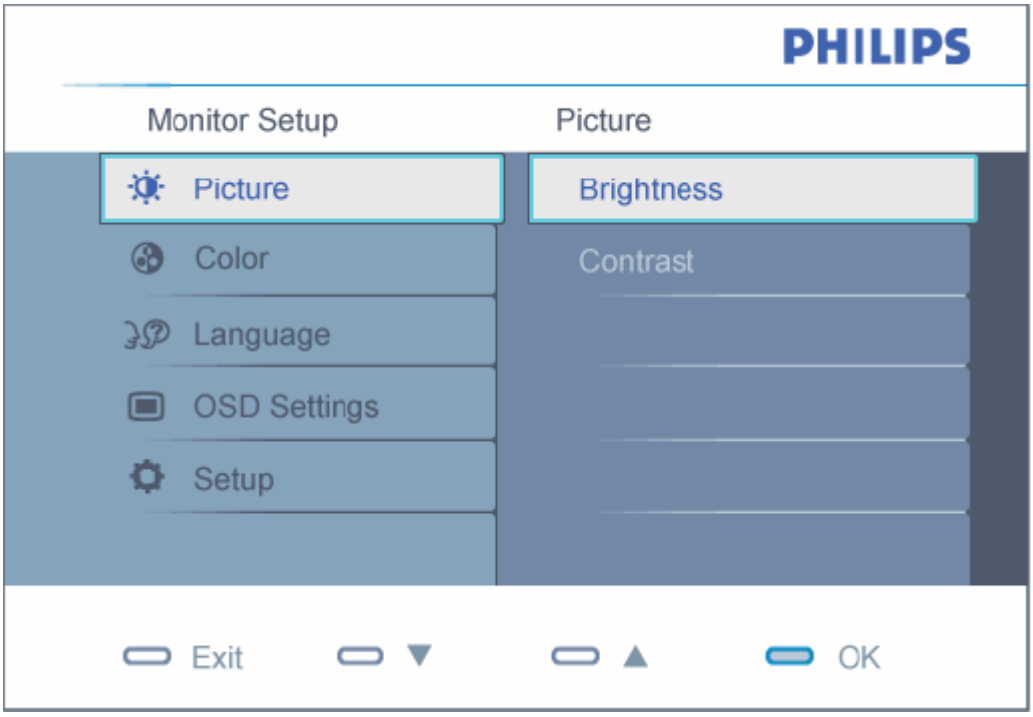
3.3 OSD Menu

Description of the On Screen Display

This is a feature in all Philips LCD monitors. It allows an end user to adjust screen performance of the monitors directly through an on-screen instruction window. The user interface provides user-friendliness and ease-of-use when operating the monitor.

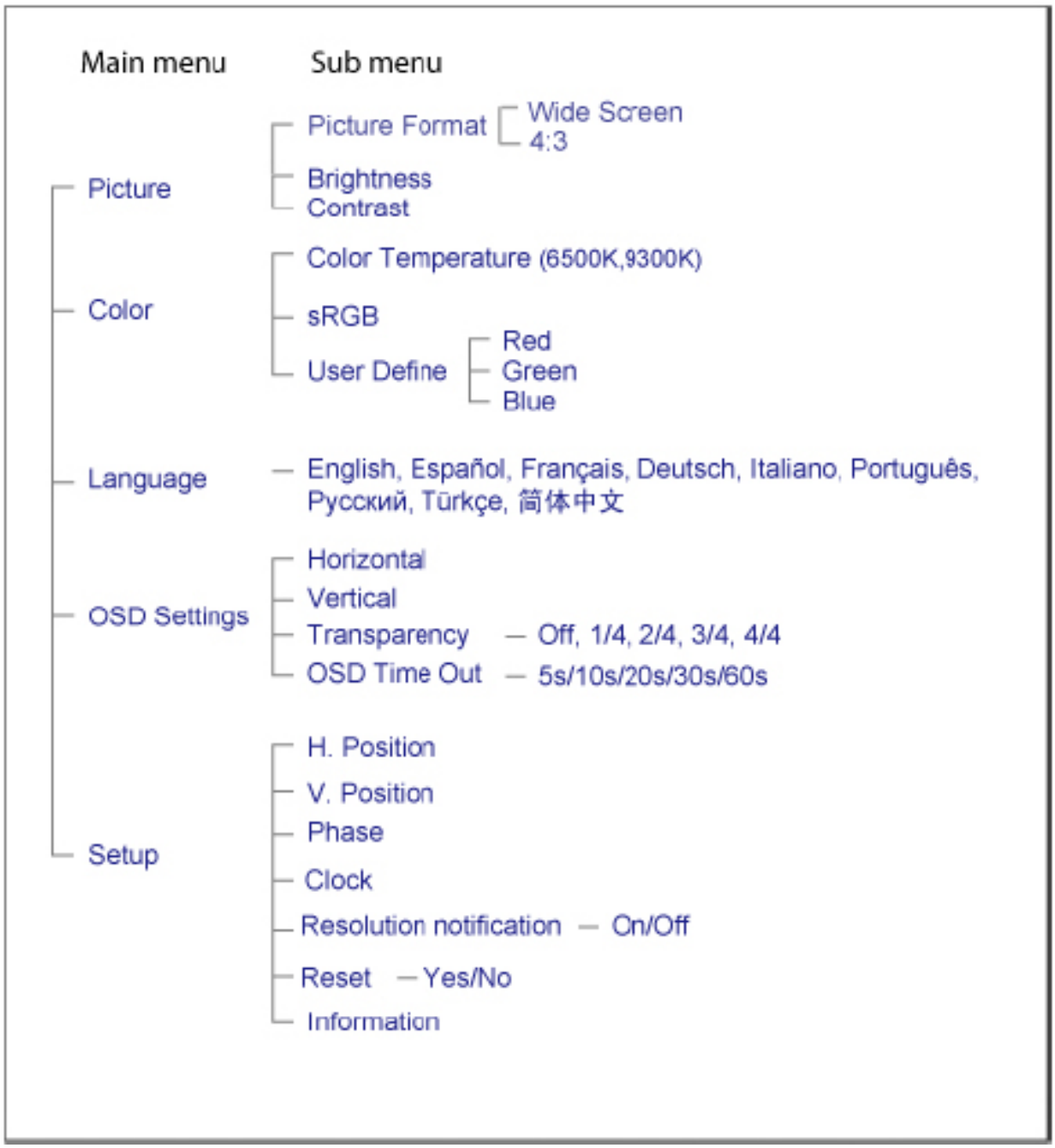
Basic and simple instruction on the control keys

When you press the **MENU/OK** button on the front control of your monitor, the On-Screen-Display (OSD) main controls window will pop up and you can then start making adjustments to your monitor's various features. Use the ▲▼ keys to make your adjustments.



The OSD tree

Below is an overall view of the structure of the On-Screen Display. You can use this as a reference when you want to work your way around the different adjustments later on.

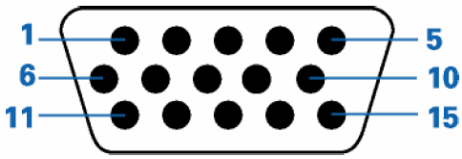


4. Input/ Output Specification

4.1 Input Signal Connector

Analog connectors

Pin No.	Description	Pin No.	Description
1	Red video input	9	DDC +5V
2	Green video input (SOG)	10	Logic ground
3	Blue video input	11	Ground
4	Sense (GND)	12	Serial data line (SDA)
5	Cable detect (GND)	13	H.Sync/ H +V.Sync
6	Red video ground	14	V.Sync
7	Green video ground	15	Data clock line (SCL)
8	Blue video ground		

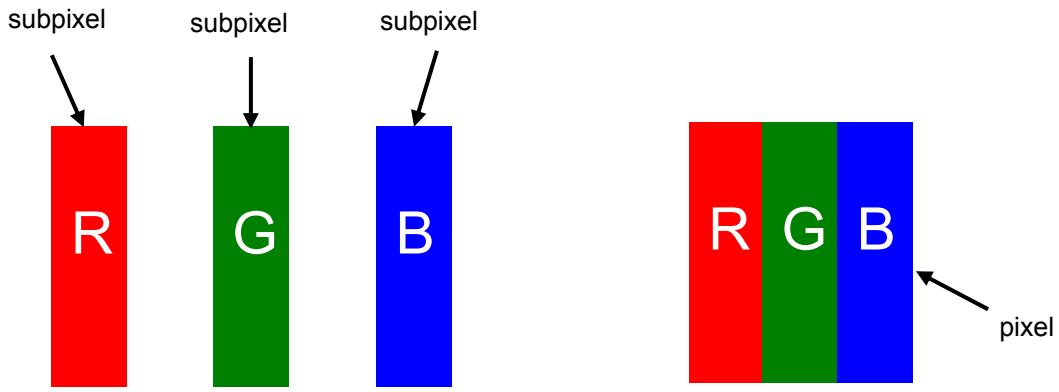


4.2 Factory Preset Modes

H. freq (KHz)	Resolution	V. freq (Hz)
31.47	720*400	70.09
31.47	640*480	59.94
37.50	640*480	75.00
37.88	800*600	60.32
46.88	800*600	75.00
48.36	1024*768	60.00
60.02	1024*768	75.03
47.74	1366*768	59.79

4.3 Pixel Defect Policy

Philips strives to deliver the highest quality products. We use some of the industry's most advanced manufacturing process and practice stringent quality control. However, pixel or sub pixel defects on the TFT LCD panels used in flat panel monitors are sometimes unavoidable. No manufacturer can guarantee that panels will be free from pixel defects, but Philips guarantees that any monitor with an unacceptable number of defects will be repaired or replaced under warranty. This notice explains the different types of pixel defects and defines acceptable defect levels for each type. In order to qualify for repair or replacement under warranty, the number of pixel defects on a TFT LCD panel must exceed these acceptable levels. For example, no more than 0.0004% of the sub pixels on a 19" XGA monitor may be defective. Furthermore, Philips sets even higher quality standard for certain types or combinations of pixel defects that are more noticeable than others. This policy is valid worldwide.



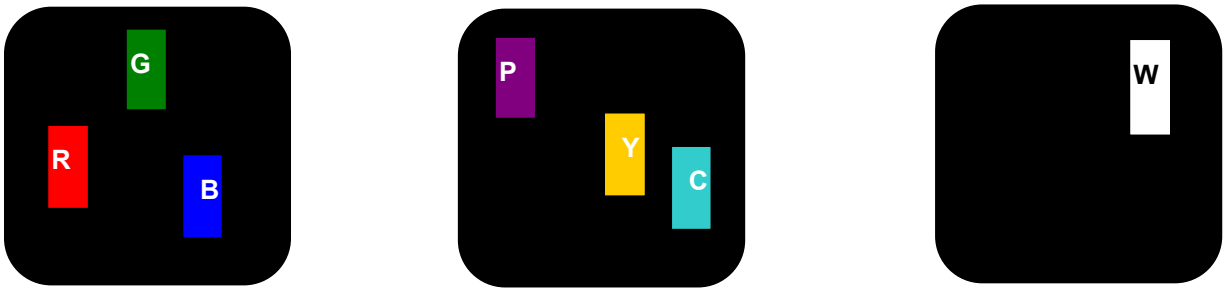
Pixels and Sub pixels

A pixel, or picture element, is composed of three sub pixels in the primary colors of red, green and blue. Many pixels together form an image. When all sub pixels of pixel are lit, the three colored sub pixels together appear as a single white pixel. When all are dark, the three colored sub pixels together appear as a signal black pixel. Other combinations of lit and dark sub appear as single pixels of other colors.

Types of Pixel Defects

Pixel and sub pixel defects appear on the screen in different ways. There are two categories of pixel defects and several types of sub pixel defects within each category.

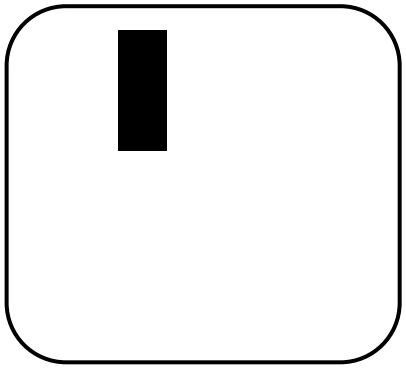
Bright Dot Defects Bright dot defects appear as pixels or sub pixels that are always lit or 'on'. That is, a Bright dot is a sub-pixel that stands out on the screen when the monitor displays a dark pattern. There are three types of bright dot defects:



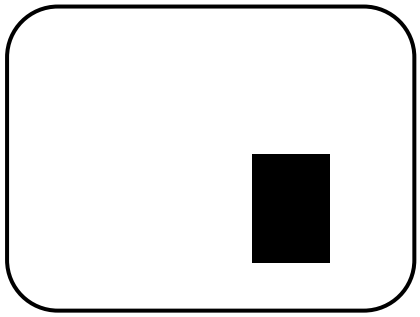
	Two adjacent lit sub pixels:	
	- Red + Blue = Purple	Three adjacent lit sub pixels
One lit red, green or blue sub pixel	- Red + Green = Yellow	(one white pixel)
	- Green + Blue = Cyan (Light Blue)	

A red or blue bright dot must be more than 50 percent brighter than neighboring dots while a green bright dot is 30 percent brighter than neighboring dots.

Black Dot Defects Black dot defects appear as pixels or sub pixels that are always dark or 'off'. That is, a dark dot is a sub-pixel that stands out on the screen when the monitor displays a light pattern. There are two types of black dot defects:



One dark sub pixel



Two or three adjacent dark sub pixels

Proximity of Pixel Defects

Because pixel and sub pixels defects of the same type that are near to one another may be more noticeable, Philips also specifies tolerances for the proximity of pixel defects.

Pixel Defect Tolerances

In order to qualify for repair or replacement due to pixel defects during the warranty period, a TFT LCD panel in a Philips flat panel monitor must have pixel or sub pixel defects exceeding the tolerances listed in the following tables.

BRIGHT DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	**160E1**
1 lit subpixel	3
2 adjacent lit subpixels	1
3 adjacent lit subpixels (one white pixel)	0
Distance between two bright dot defects *	>15mm
Total bright dot defects of all types	3

BLACK DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	**160E1**
1 dark subpixel	5
2 adjacent dark subpixels	2
3 adjacent dark subpixels	0
Distance between two black dot defects *	>15mm
Total black dot defects of all types	5

TOTAL DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	**160E1**
Total bright or black dot defects of all types	5

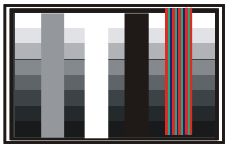
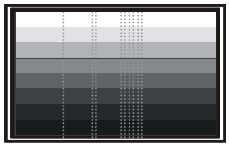
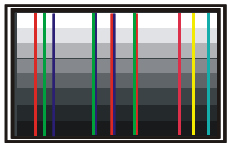
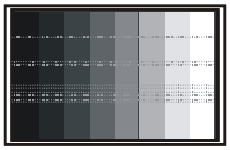
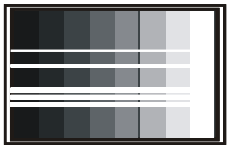
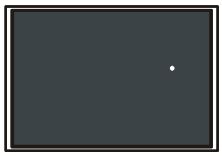
Note:

* 1 or 2 adjacent sub pixel defects = 1 dot defect

4.4 Failure Mode Of Panel

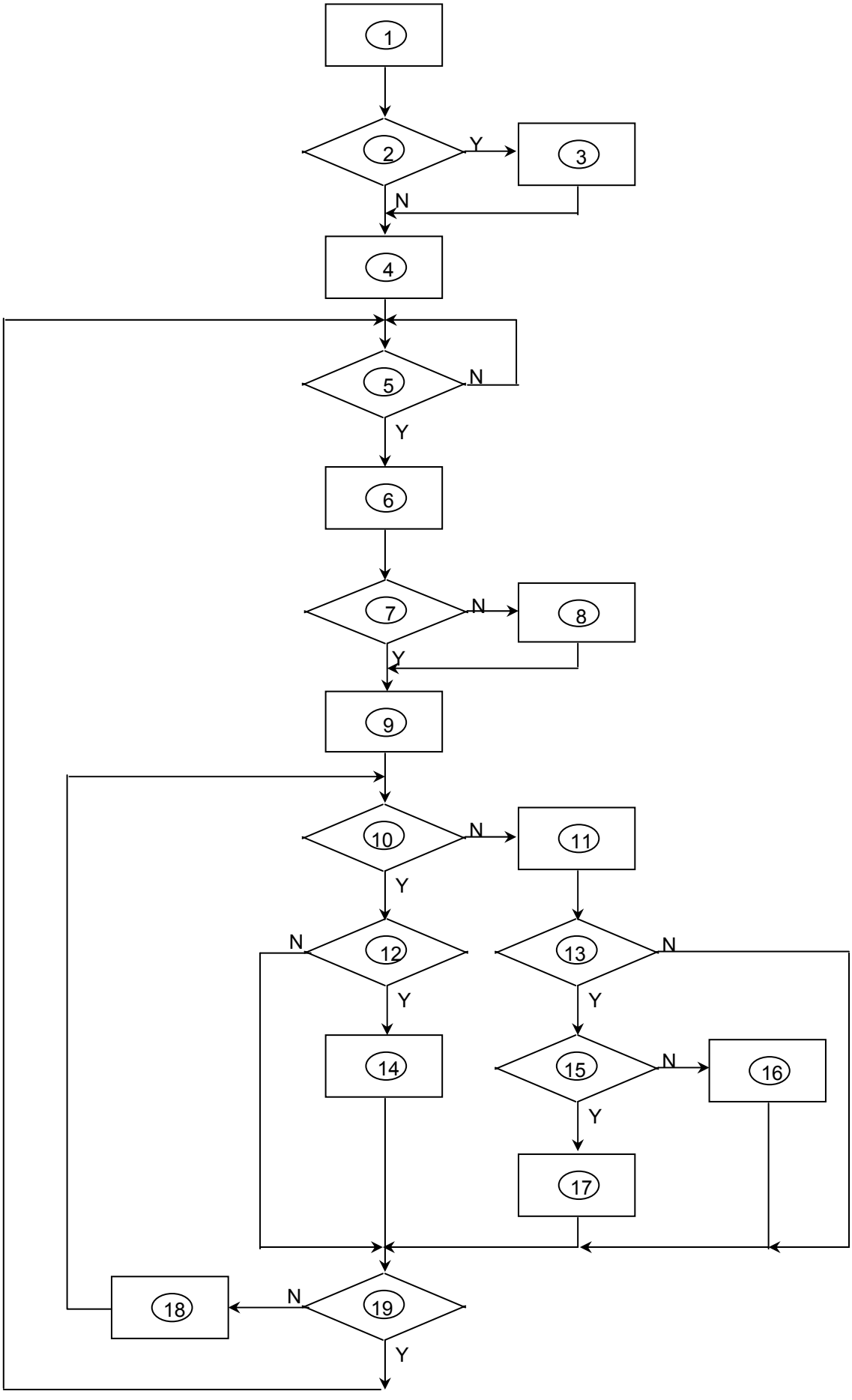
Quick reference for failure mode of LCD panel

this page presents problems that could be made by LCD panel.
It is not necessary to repair circuit board. Simply follow the mechanical instruction on this manual to eliminate failure by replace LCD panel.

Failure description	Phenomenon
Vertical block defect	
Vertical dim lines	
Vertical lines defect (Always bright or dark)	
Horizontal block defect	
Horizontal dim lines	
Horizontal lines defect (Always bright or dark)	
Has bright or dark pixel	
Polarizer has bubbles	
Polarizer has bubbles	
Foreign material inside polarizer. It shows liner or dot shape.	
Concentric circle formed	
Bottom back light of LCD is brighter than normal	
Back light un-uniformity	
Backlight has foreign material. Black or white color, liner or circular type	

5. Block Diagram

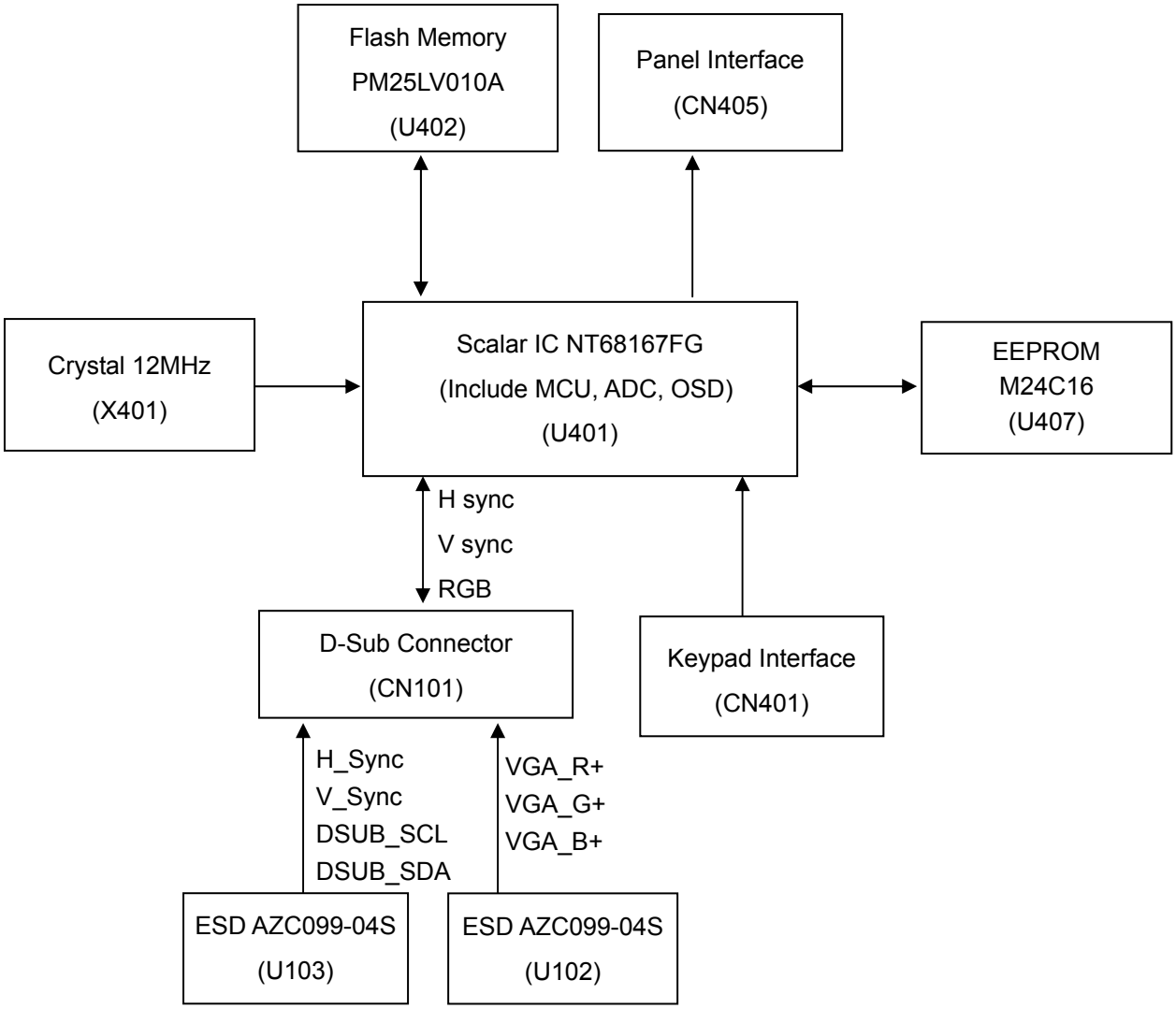
5.1 Software Flow Chat



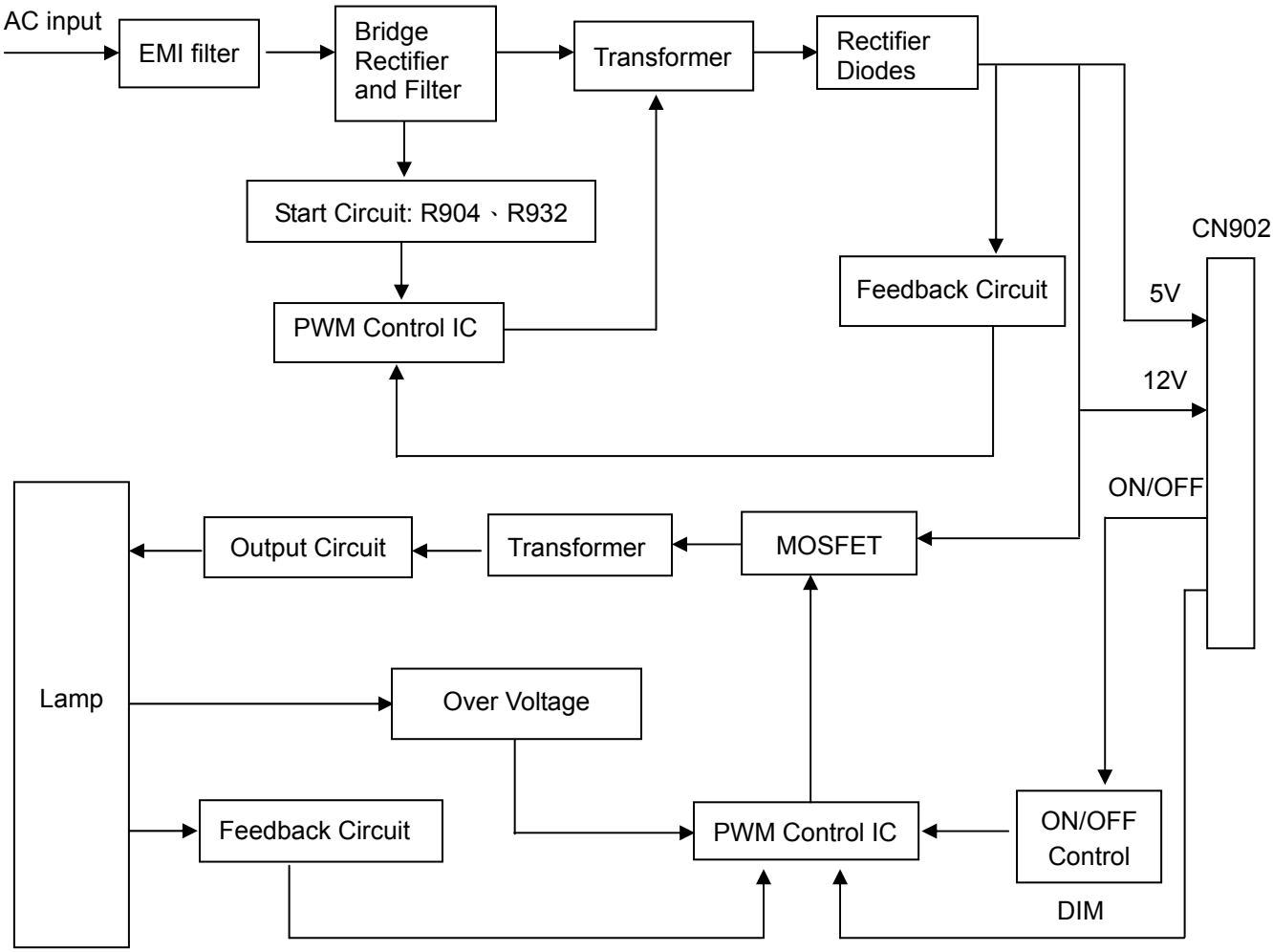
1) MCU initializes.
2) Is the EPROM blank?
3) Program the EPROM by default values.
4) Get the PWM value of brightness from EPROM.
5) Is the power key pressed?
6) Clear all global flags.
7) Are the AUTO and SELECT keys pressed?
8) Enter factory mode.
9) Save the power key status into EPROM. Turn on the LED and set it to green color. Scalar initializes
10) In standby mode?
11) Update the lifetime of back light.
12) Check the analog port, are there any signals coming?
13) Does the scalar send out an interrupt request?
14) Wake up the scalar.
15) Are there any signals coming from analog port?
16) Display "No connection Check Signal Cable" message. And go into standby mode after the message disappears.
17) Program the scalar to be able to show the coming mode.
18) Process the OSD display.
19) Read the keyboard. Is the power key pressed?

5.2 Electrical Block Diagram

5.2.1 Main Board



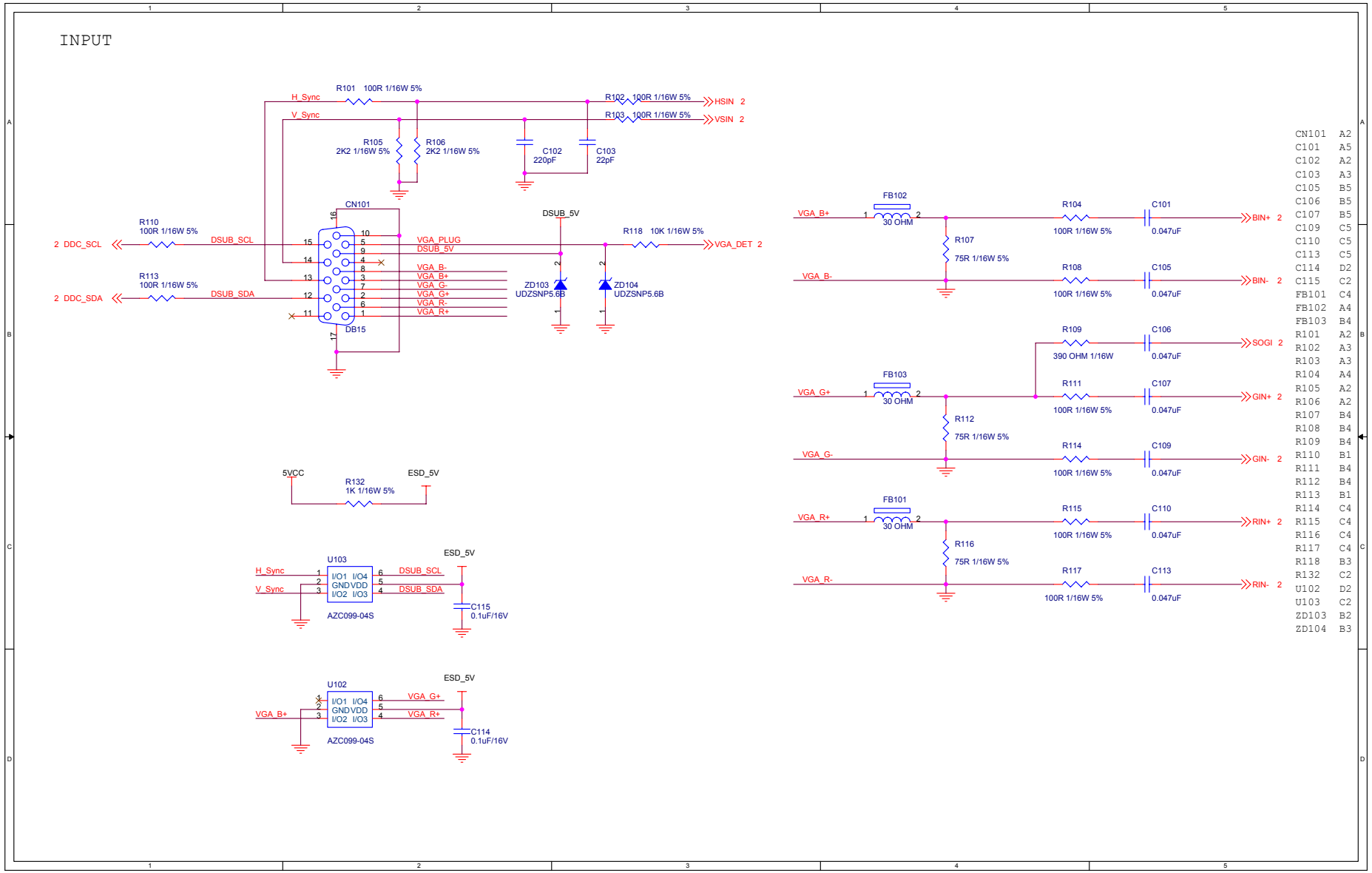
5.2.2 Power/Inverter Board

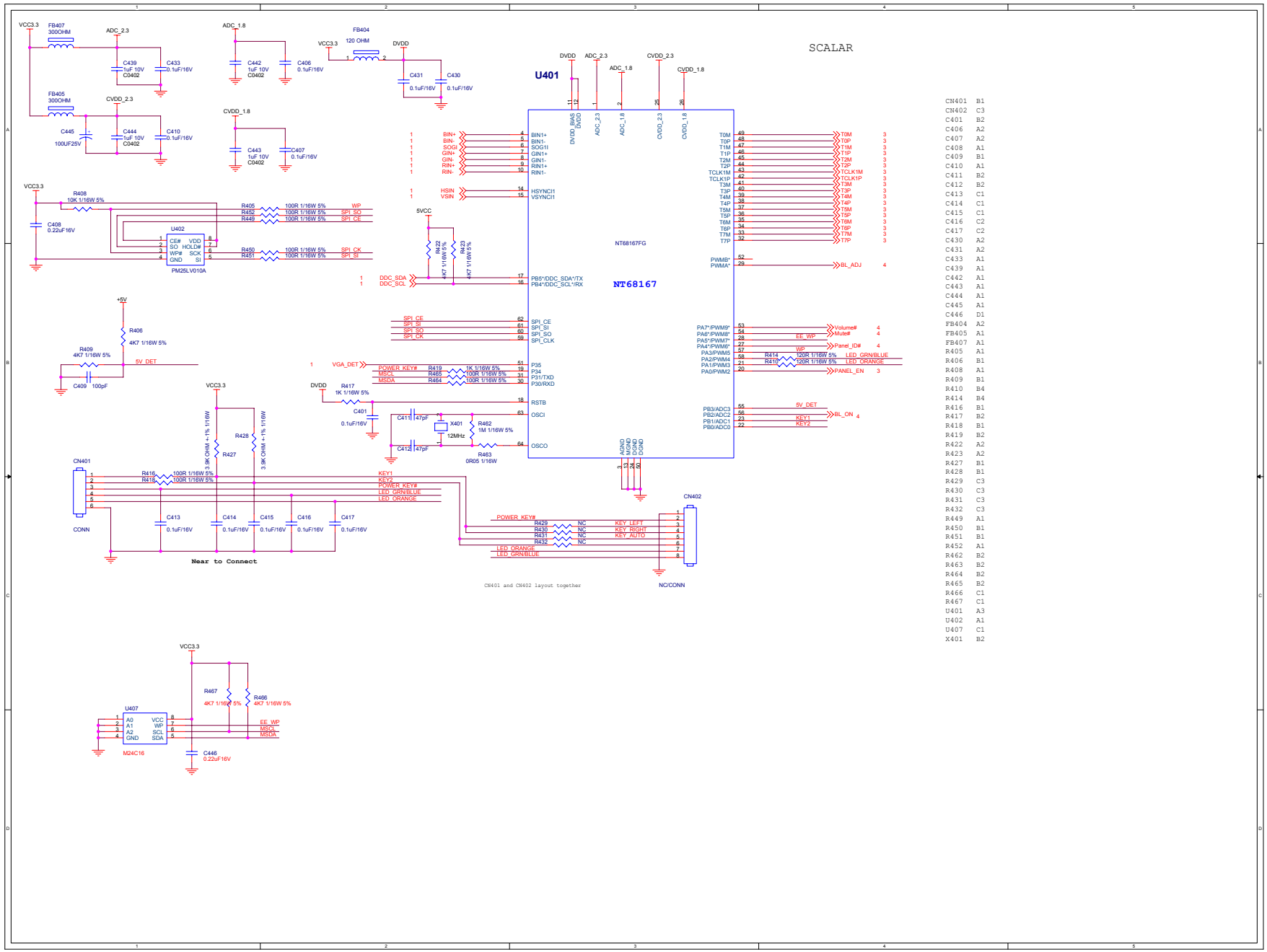


6. Schematic

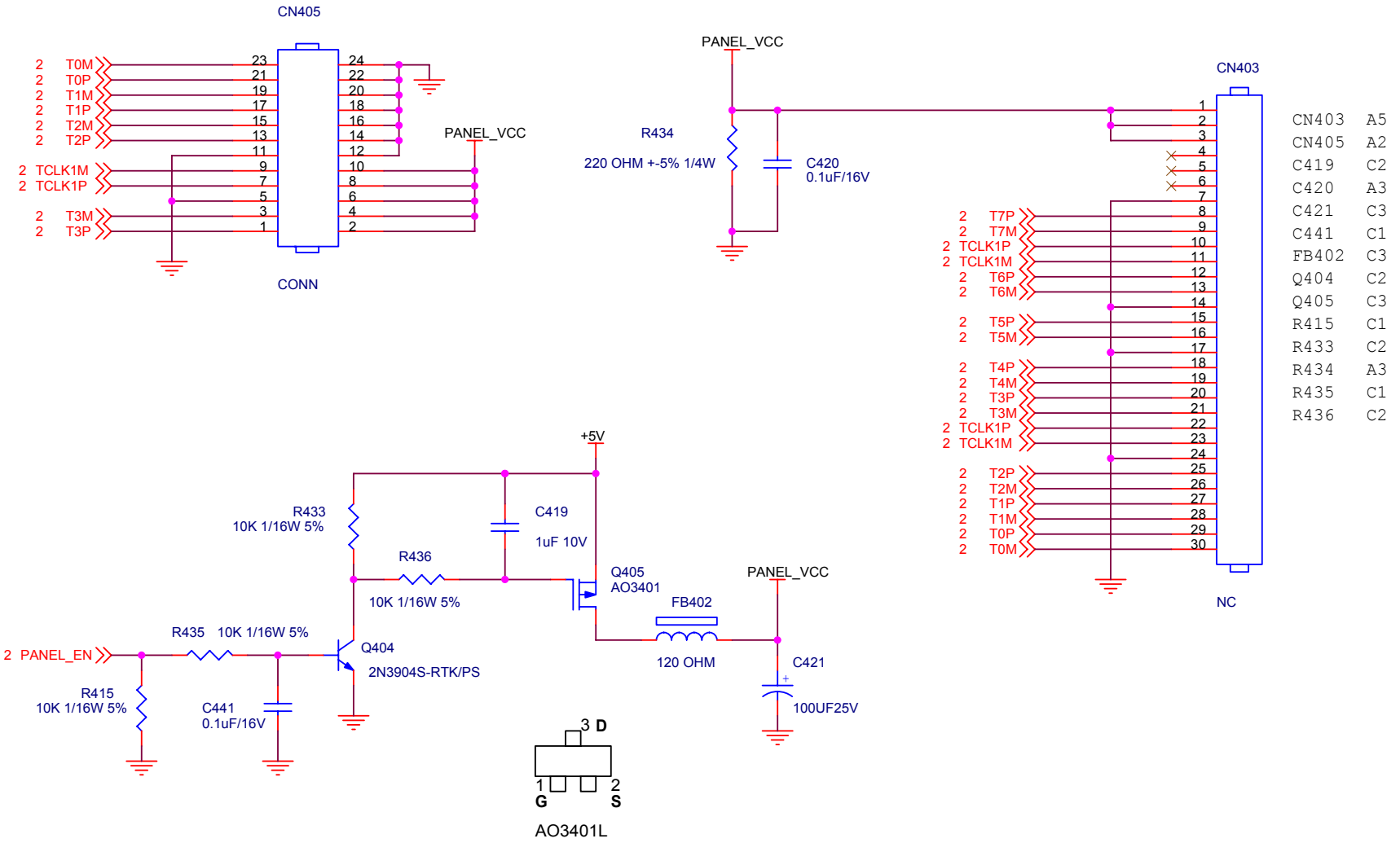
6.1 Main Board

715G3213-F

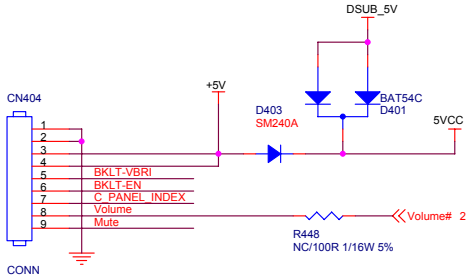


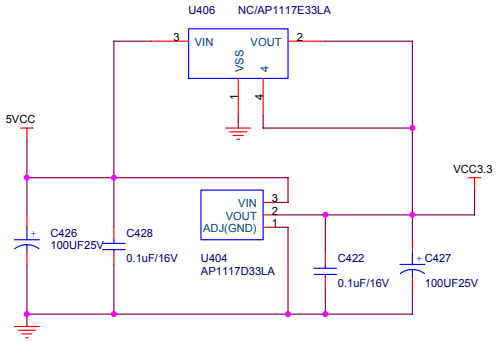

SCALAR
U401
NT68167FG
NT68167
CN401 and CN402 layout together
NC/CONN
Near to Connect
CONN
M24C16
PM25LV010A
CN401 B1
CN402 C3
C401 B2
C406 A2
C407 A2
C408 A1
C409 B1
C410 A1
C411 B2
C412 B2
C413 C1
C414 C1
C415 C1
C416 C2
C417 C2
C430 A2
C431 A2
C433 A1
C439 A1
C442 A1
C443 A1
C444 A1
C445 A1
C446 D1
FB404 A2
FB405 A1
FB407 A1
R405 A1
R406 B1
R408 A1
R409 B1
R410 B4
R414 B4
R416 B1
R417 B2
R418 B1
R419 B2
R422 A2
R423 A2
R427 B1
R428 B1
R429 C3
R430 C3
R431 C3
R432 C3
R449 A1
R450 B1
R451 B1
R452 A1
R462 B2
R463 B2
R464 B2
R465 B2
R466 C1
R467 C1
U401 A3
U402 A1
U407 C1
X401 B2

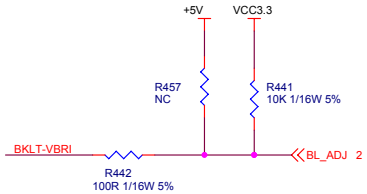
OUTPUT

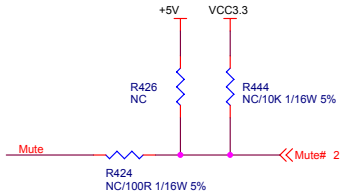

CN405
2 T0M
2 T0P
2 T1M
2 T1P
2 T2M
2 T2P
2 TCLK1M
2 TCLK1P
2 T3M
2 T3P
23 21 19 17 15 13 11 9 7 5 3 1
24 22 20 18 16 14 12 10 8 6 4 2
PANEL_VCC
CONN
PANEL_VCC
R434
220 OHM +-5% 1/4W
C420
0.1uF/16V
CN403
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2 T7P
2 T7M
2 TCLK1P
2 TCLK1M
2 T6P
2 T6M
2 T5P
2 T5M
2 T4P
2 T4M
2 T3P
2 T3M
2 TCLK1P
2 TCLK1M
2 T2P
2 T2M
2 T1P
2 T1M
2 T0P
2 T0M
NC
CN403 A5
CN405 A2
C419 C2
C420 A3
C421 C3
C441 C1
FB402 C3
Q404 C2
Q405 C3
R415 C1
R433 C2
R434 A3
R435 C1
R436 C2
+5V
R433
10K 1/16W 5%
C419
1uF 10V
R436
10K 1/16W 5%
Q405
AO3401
FB402
120 OHM
PANEL_VCC
C421
100UF25V
2 PANEL_EN
R435 10K 1/16W 5%
Q404
2N3904S-RTK/PS
R415
10K 1/16W 5%
C441
0.1uF/16V
3 D
1 G
2 S
AO3401L

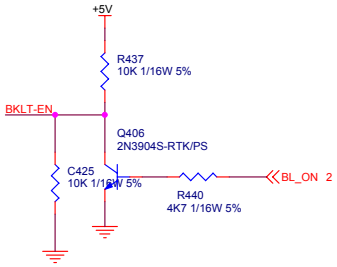
POWER

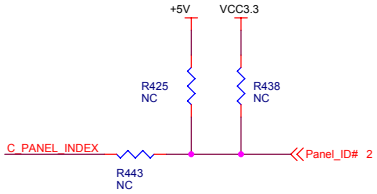








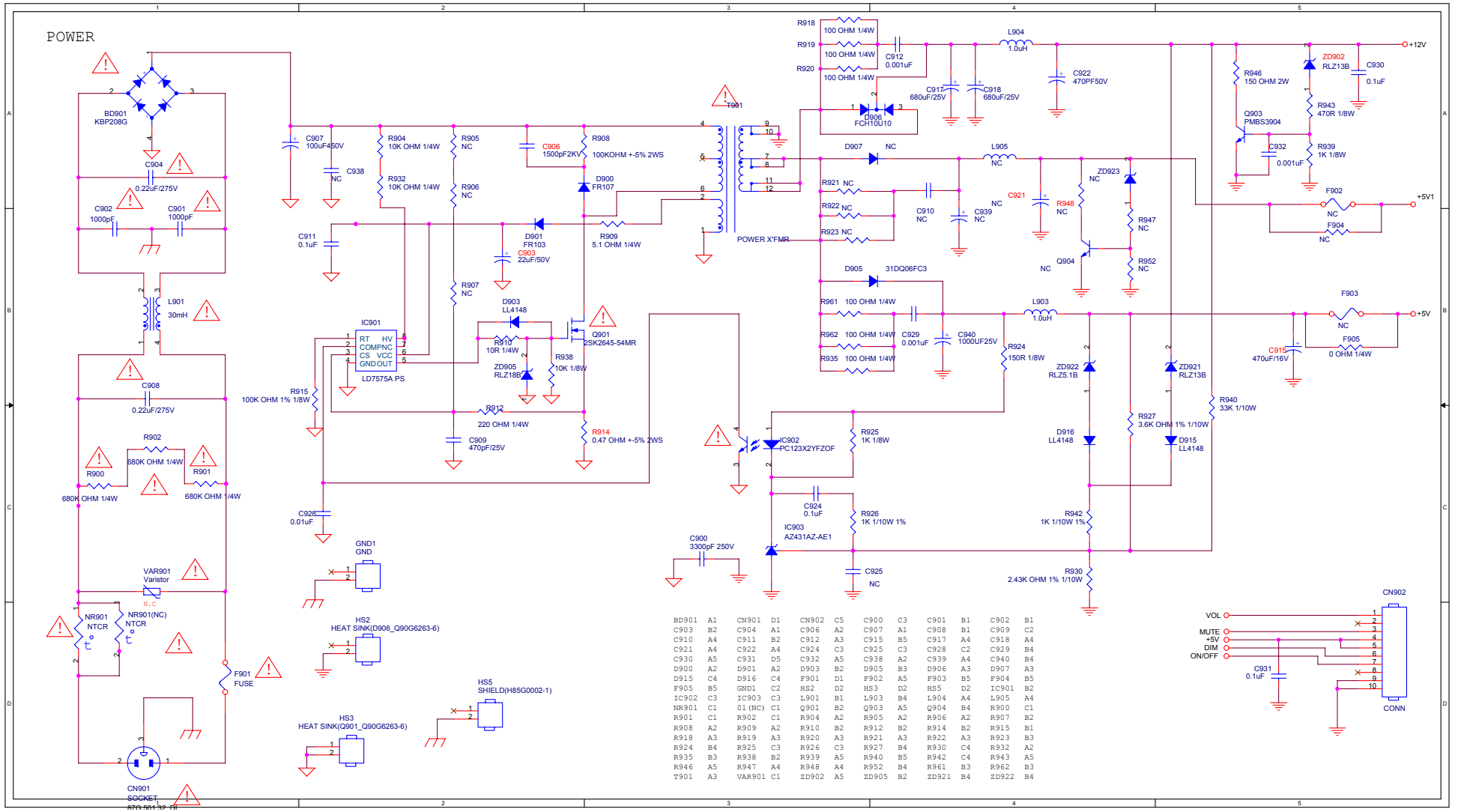


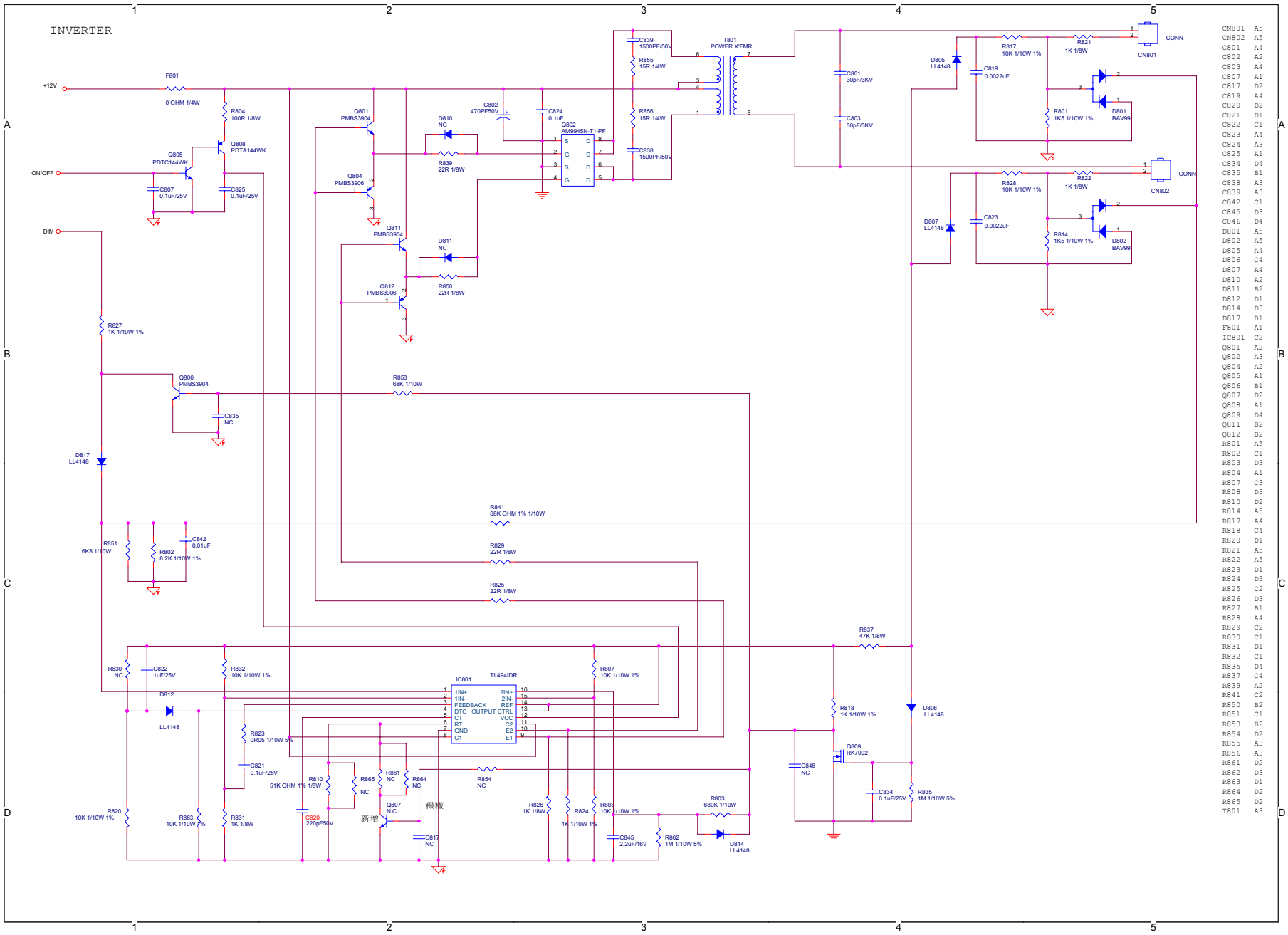


CN404	A1
C422	B4
C425	D1
C426	B3
C427	B4
C428	B3
D401	A2
D403	A2
Q406	D1
R424	C2
R425	C3
R426	B2
R437	C1
R438	C3
R440	D1
R441	B2
R442	C1
R443	C2
R444	B3
R448	B2
R457	B1
U404	B4
U406	A4

6.2 Power Board

715G2852-2

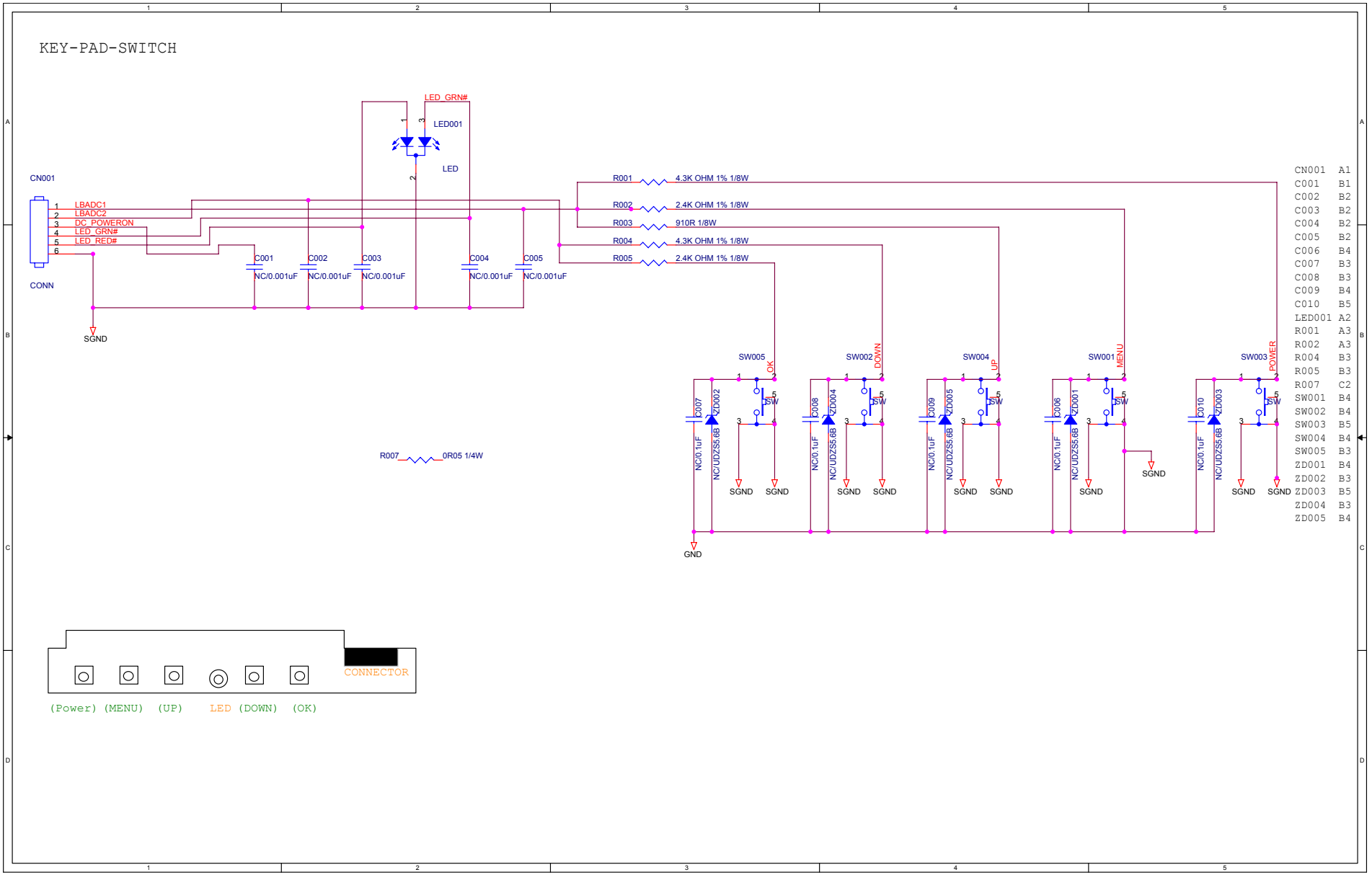




CN801 A5
CN802 A5
C801 A4
C802 A2
C803 A4
C807 A1
C817 D2
C819 A4
C820 D2
C821 D1
C822 C1
C823 A4
C824 A3
C825 A1
C834 D4
C835 B1
C838 A3
C839 A3
C842 C1
C845 D3
C846 D4
D801 A5
D802 A5
D805 A4
D806 C4
D807 A4
D810 A2
D811 B2
D812 D1
D814 D3
D817 B1
F801 A1
IC801 C2
Q801 A2
Q802 A3
Q804 A2
Q805 A1
Q806 B1
Q807 D2
Q808 A1
Q809 D4
Q811 B2
Q812 B2
R801 A5
R802 C1
R803 D3
R804 A1
R807 C3
R808 D3
R810 D2
R814 A5
R817 A4
R818 C4
R820 D1
R821 A5
R822 A5
R823 D1
R824 D3
R825 C2
R826 D3
R827 B1
R828 A4
R829 C2
R830 C1
R831 D1
R832 C1
R835 D4
R837 C4
R839 A2
R841 C2
R850 B2
R851 C1
R853 B2
R854 D2
R855 A3
R856 A3
R861 D2
R862 D3
R863 D1
R864 D2
R865 D2
T801 A3

6.3 Key Board

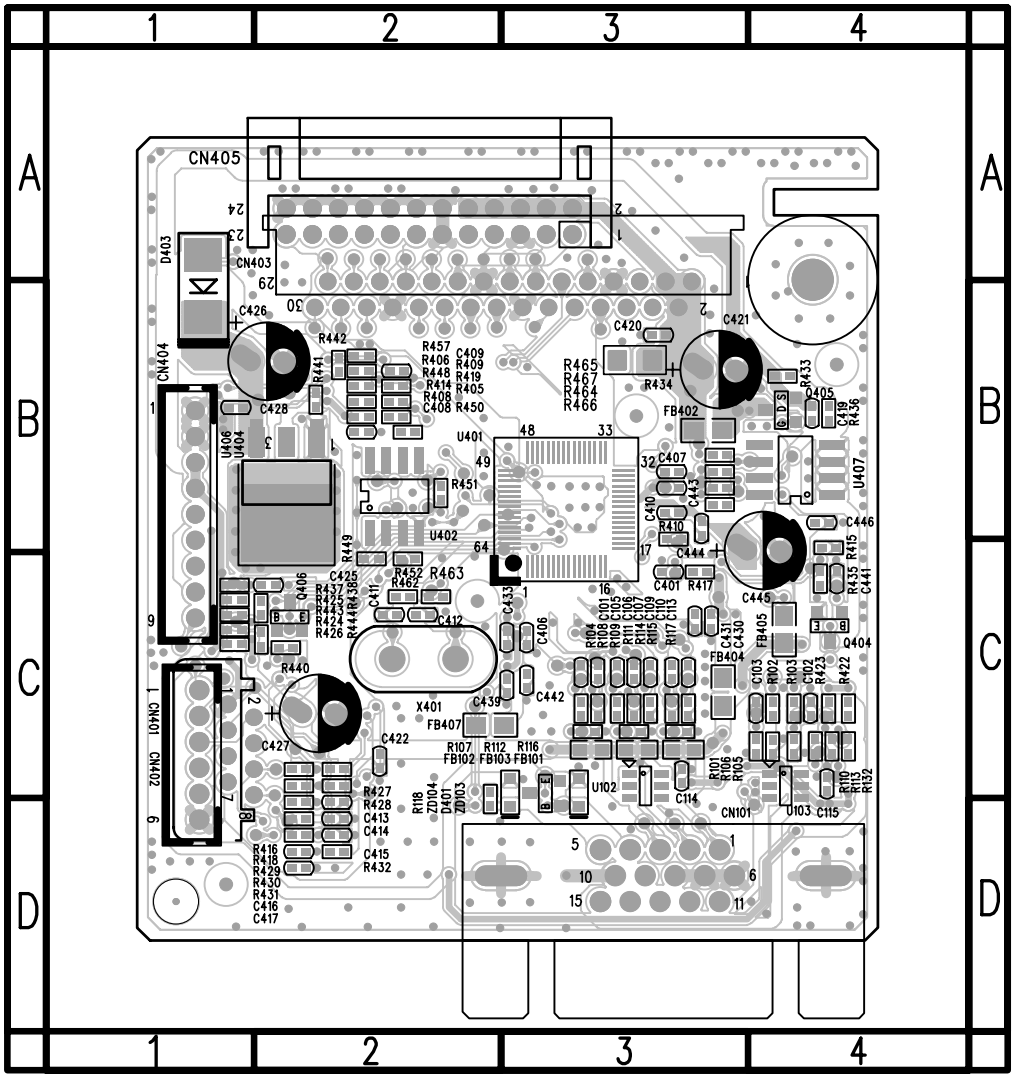
715G3016-1



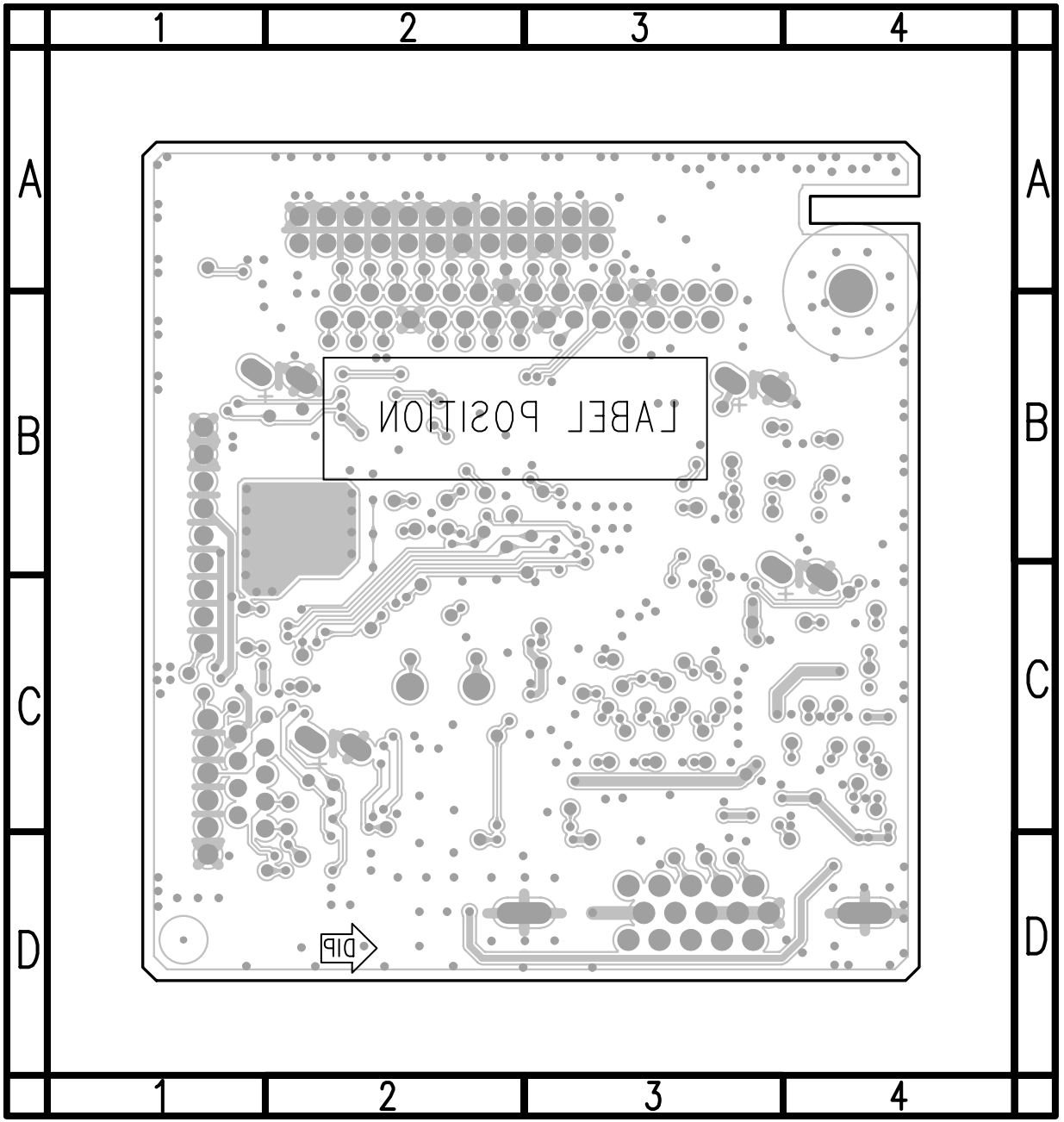
7. PCB Layout

7.1 Main Board

715G3213-F

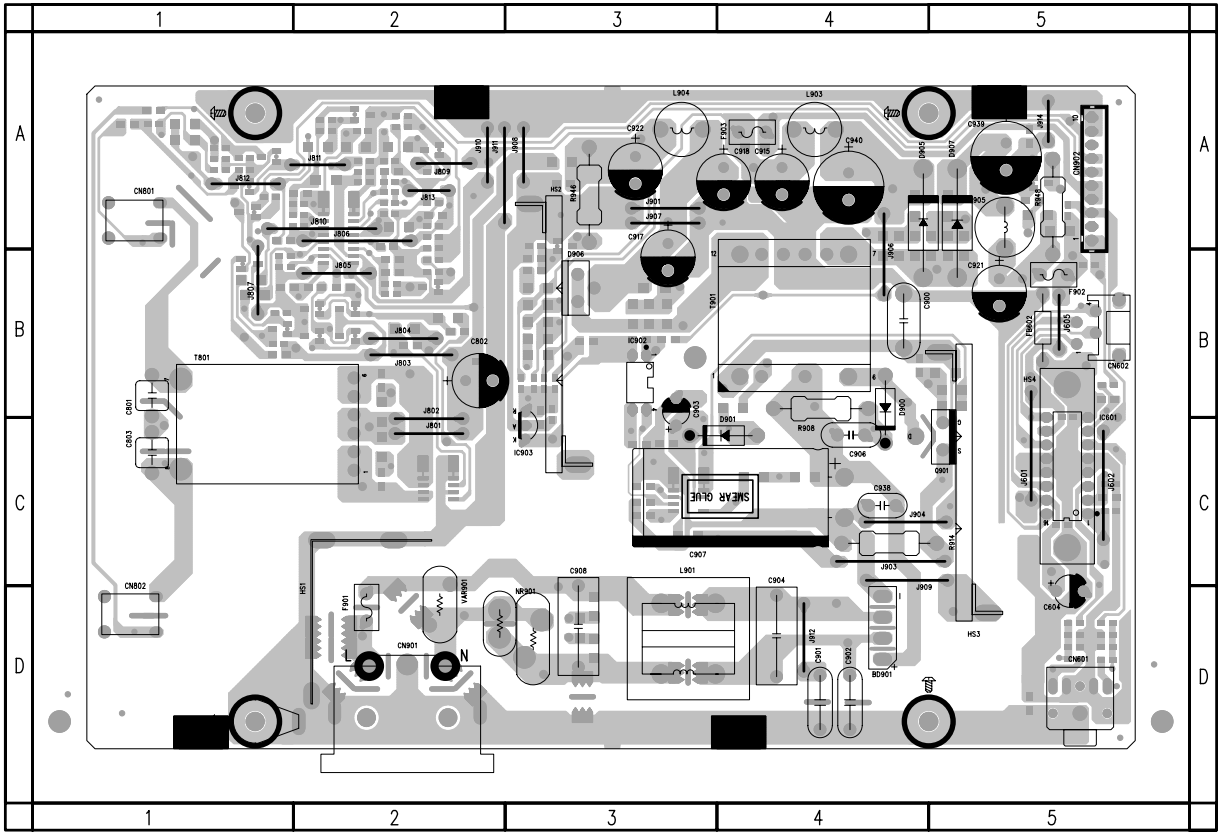


C101	C3	C417	D2	CN404	B1	R110	C4	R424	C1	R451	B2
C102	C4	C419	B4	CN405	A2	R111	C3	R425	C1	R452	C2
C103	C3	C420	B3	D401	D3	R112	C3	R426	C1	R457	B2
C105	C3	C421	B3	D403	B1	R113	C4	R427	C2	R462	C2
C106	C3	C422	C2	FB101	C3	R114	C3	R428	C2	R463	C2
C107	C3	C425	C2	FB102	C3	R115	C3	R429	C2	R464	B3
C109	C3	C426	B2	FB103	C3	R116	C3	R430	D2	R465	B3
C110	C3	C427	C2	FB402	B3	R117	C3	R431	D2	R466	B3
C113	C3	C428	B1	FB404	C3	R118	C2	R432	D2	R467	B3
C114	C3	C430	C3	FB405	C4	R132	C4	R433	B4	U102	C3
C115	C4	C431	C3	FB407	C2	R405	B2	R434	B3	U103	C4
C401	C3	C433	C2	Q404	C4	R406	B2	R435	C4	U401	B3
C406	C3	C439	C2	Q405	B4	R408	B2	R436	B4	U402	B2
C407	B3	C441	C4	Q406	C2	R409	B2	R437	C1	U404	B2
C408	B2	C442	C3	R101	C3	R410	C3	R438	C2	U406	B2
C409	B2	C443	B3	R102	C4	R414	B2	R440	C2	U407	B4
C410	B3	C444	B3	R103	C4	R415	C4	R441	B2	X401	C2
C411	C2	C445	C4	R104	C3	R416	C2	R442	B2	ZD103	C3
C412	C2	C446	B4	R105	C4	R417	C3	R443	C1	ZD104	C3
C413	C2	CN101	D3	R106	C4	R418	C2	R444	C2		
C414	D2	CN401	C1	R107	C3	R419	B2	R448	B2		
C415	D2	CN402	C1	R108	C3	R422	C4	R449	C2		
C416	D2	CN403	B2	R109	C3	R423	C4	R450	B2		

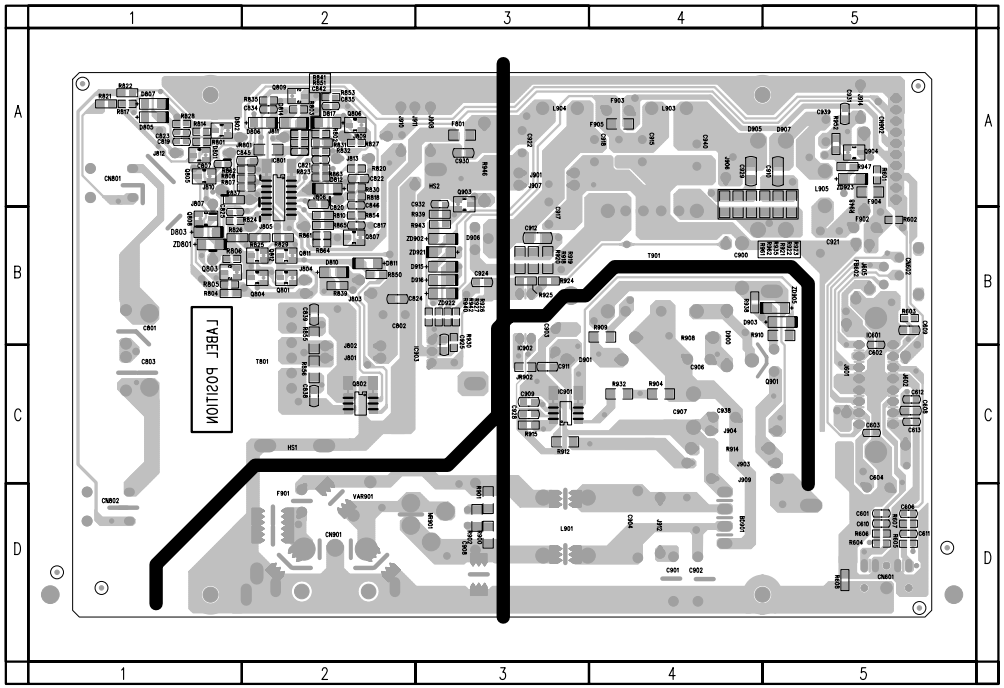

1
2
3
4
A
B
C
D
LABEL POSITION
DIP

7.2 Power Board

715G2852-3-4



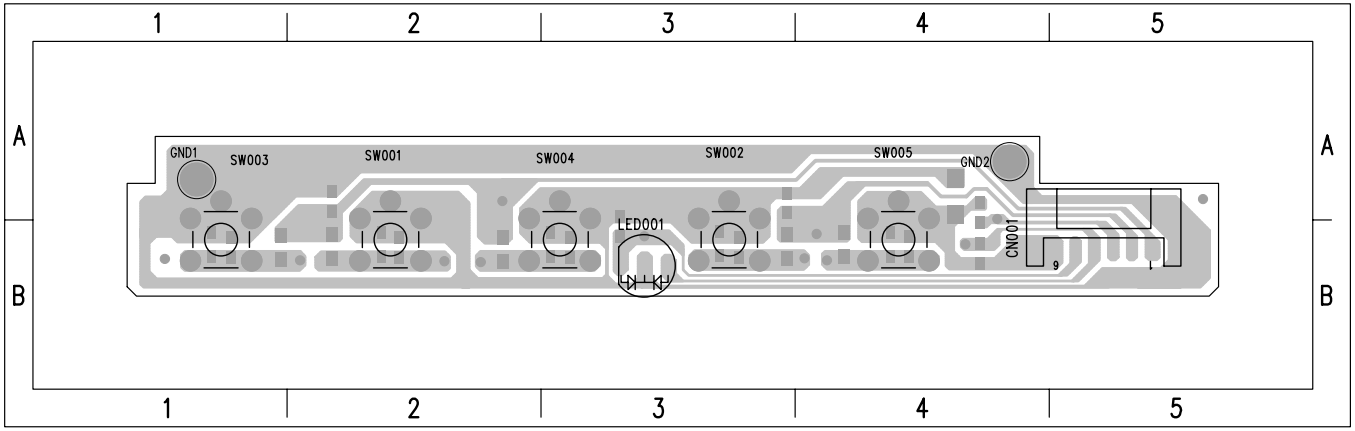
BD901	D4	C940	A4	IC903	C3	J907	A3
C604	C5	CN601	D5	J601	C5	J908	A3
C801	B1	CN602	B5	J602	C5	J909	C4
C802	B2	CN801	A1	J605	B5	J910	A2
C803	C1	CN802	D1	J801	C2	J911	A3
C900	B4	CN901	D2	J802	C2	J912	D4
C901	D4	CN902	A5	J803	B2	J914	A5
C902	D4	D900	C4	J804	B2	L901	D3
C903	B3	D901	C3	J805	B2	L903	A4
C904	D4	D905	A4	J806	B2	L904	A3
C906	C4	D906	B3	J807	B1	L905	B5
C907	C4	D907	A4	J809	A2	NR901	D3
C908	D3	F901	C2	J810	B2	Q901	C4
C915	A4	F902	B5	J811	A2	R908	B4
C917	B3	F903	A4	J812	A2	R914	C4
C918	A3	FB602	B5	J813	A2	R946	B3
C921	B5	GND1	D1	J901	A3	R948	A5
C922	A3	GND2	D3	J903	C4	T801	C2
C938	C4	IC601	C5	J904	C4	T901	B4
C939	A5	IC902	B3	J906	B4	VAR901	C2



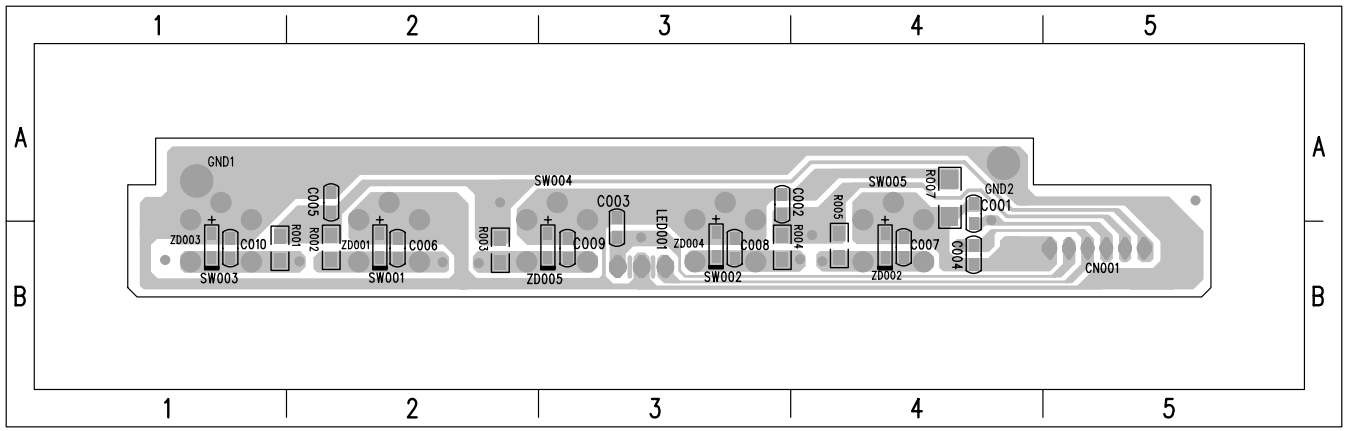
C601	D5	C909	C3	F904	B5	R608	D5	R835	A2	R921	B4
C602	B5	C910	A4	F905	A4	R801	A1	R837	B2	R922	B4
C603	C5	C911	C3	IC801	A2	R802	A2	R839	B2	R923	B5
C606	D5	C912	B3	IC901	C3	R803	A2	R841	A2	R924	B3
C608	C5	C924	B3	JR801	A2	R804	B2	R850	B2	R925	B3
C609	B5	C925	B3	JR902	C3	R805	B2	R851	A2	R926	B3
C610	D5	C928	C3	Q801	B2	R806	B2	R853	A2	R927	B3
C611	D5	C929	A4	Q802	C2	R807	B2	R854	B2	R930	B3
C612	C5	C930	A3	Q803	B2	R808	A2	R855	B2	R932	C4
C613	C5	C931	A5	Q804	B2	R810	B2	R856	C2	R935	B4
C807	A2	C932	B3	Q805	A1	R814	A1	R861	B2	R938	B4
C817	B2	D801	A1	Q806	A2	R817	A1	R862	A2	R939	B3
C819	A1	D802	A2	Q807	B2	R818	B2	R863	A2	R940	B3
C820	B2	D803	B1	Q808	B1	R820	A2	R864	B2	R942	B3
C821	A2	D805	A1	Q809	A2	R821	A1	R865	B2	R943	B3
C822	A2	D806	A2	Q811	B2	R822	A1	R900	D3	R947	A5
C823	A1	D807	A1	Q812	B2	R823	A2	R901	C3	R952	A5
C824	B2	D810	B2	Q903	B3	R824	B2	R902	D3	R961	B4
C825	B2	D811	B2	Q904	A5	R825	B2	R904	C4	R962	B4
C834	A2	D812	B2	R601	A5	R826	B2	R909	B4	ZD801	B1
C835	A2	D814	A2	R602	B5	R827	A2	R910	B4	ZD902	B3
C838	C2	D817	A2	R603	B5	R828	A1	R912	C3	ZD905	B4
C839	B2	D903	B4	R604	D5	R829	B2	R915	C3	ZD921	B3
C842	A2	D915	B3	R605	D5	R830	B2	R918	B3	ZD922	B3
C845	A2	D916	B3	R606	D5	R831	A2	R919	B3	ZD923	A5
C846	B2	F801	A3	R607	D5	R832	A2	R920	B3		

7.3 Key Board

715G3016-1

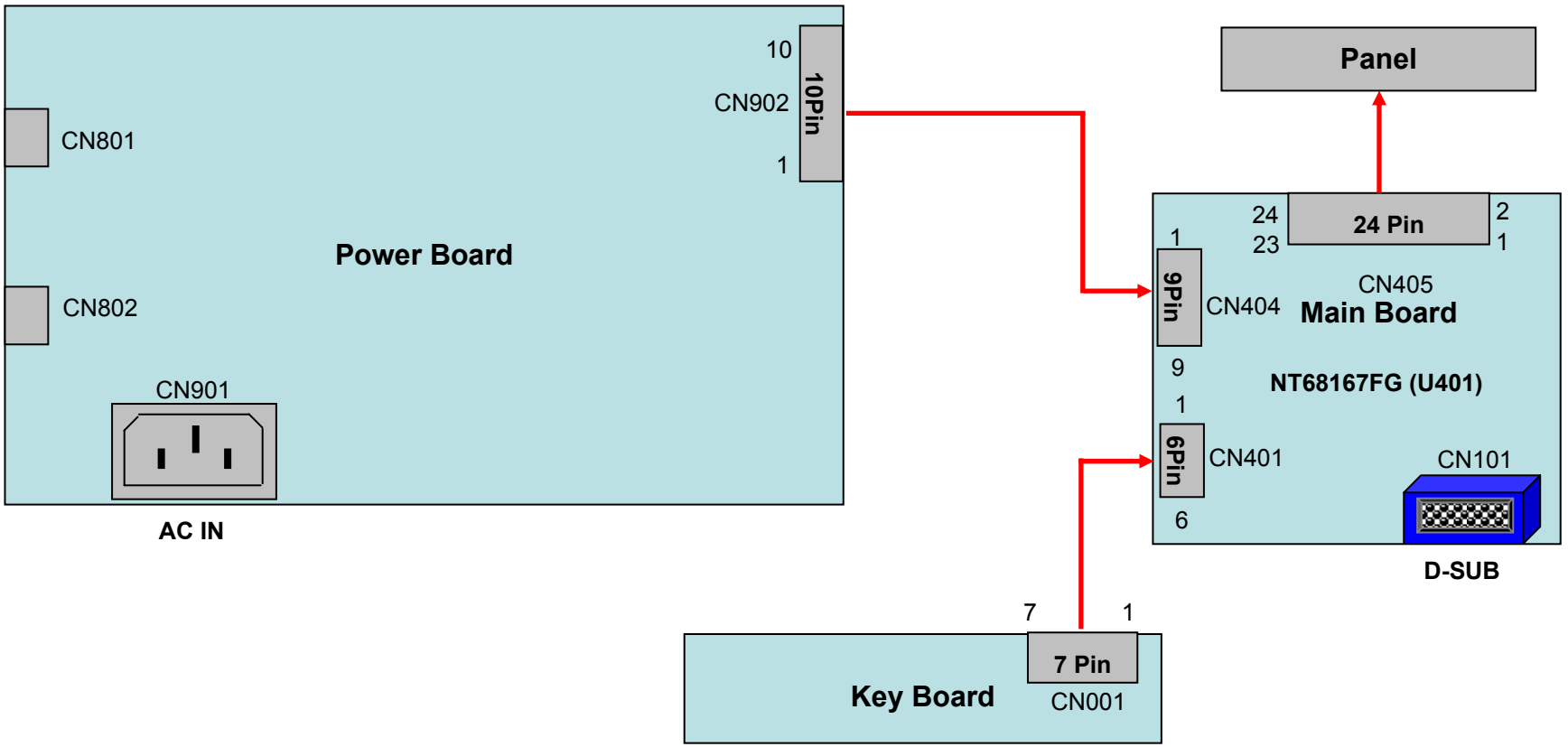


CN001	B5		
GND1	A1		
GND2	A4		
LED001	B3		
SW001	B2		
SW002	B3		
SW003	B1		
SW004	B3		
SW005	B4		

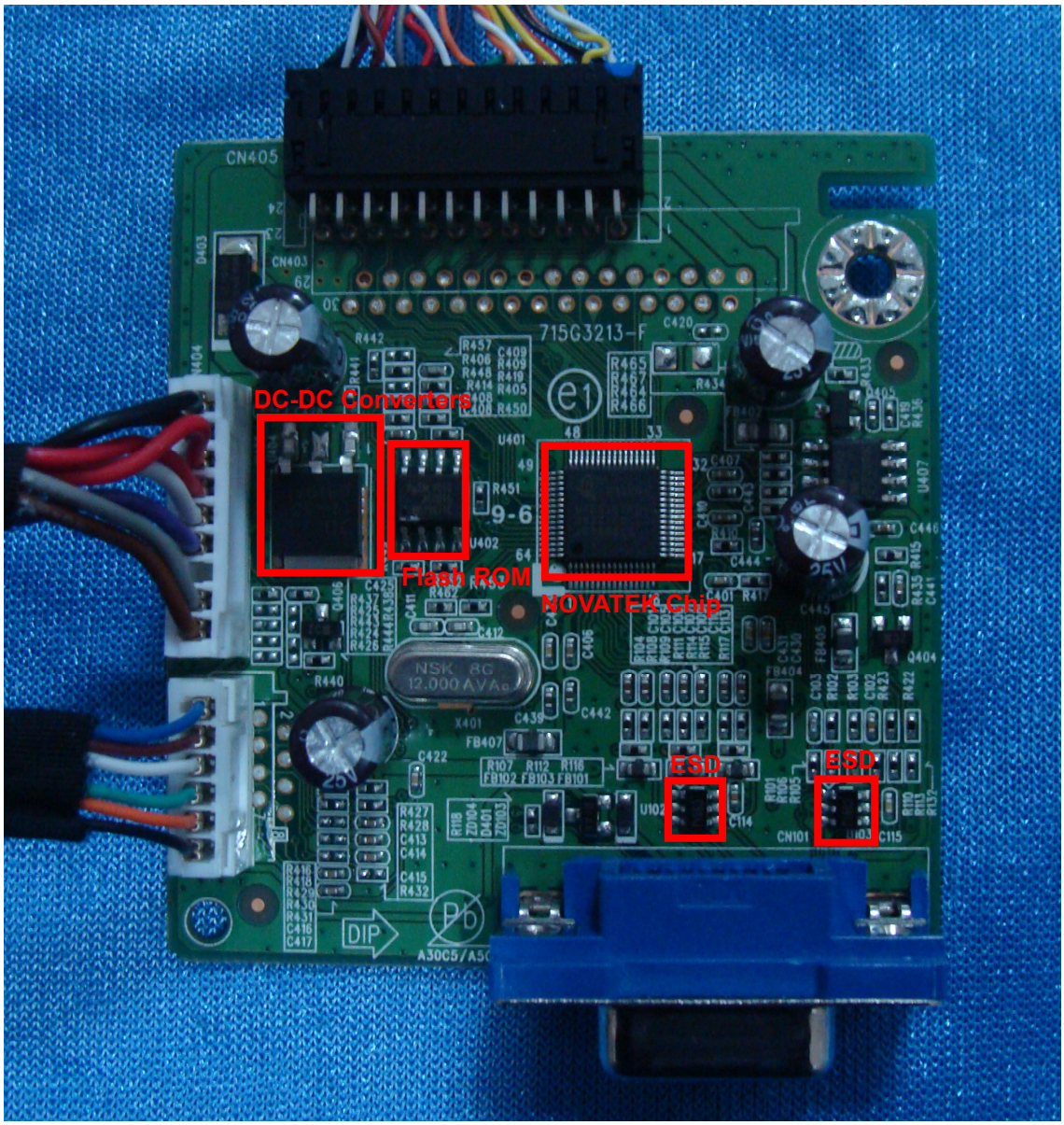


C001	A4	R002	B2
C002	A3	R003	B2
C003	B3	R004	B3
C004	B4	R005	B4
C005	A2	R007	A4
C006	B2	ZD001	B2
C007	B4	ZD002	B4
C008	B3	ZD003	B1
C009	B3	ZD004	B3
C010	B1	ZD005	B3
R001	B1		

8. Wiring Diagram



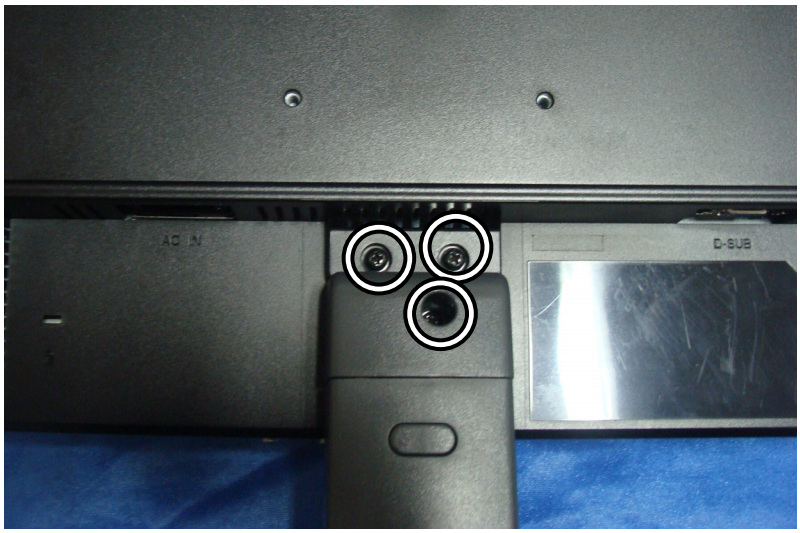
9. Scalar Board Overview



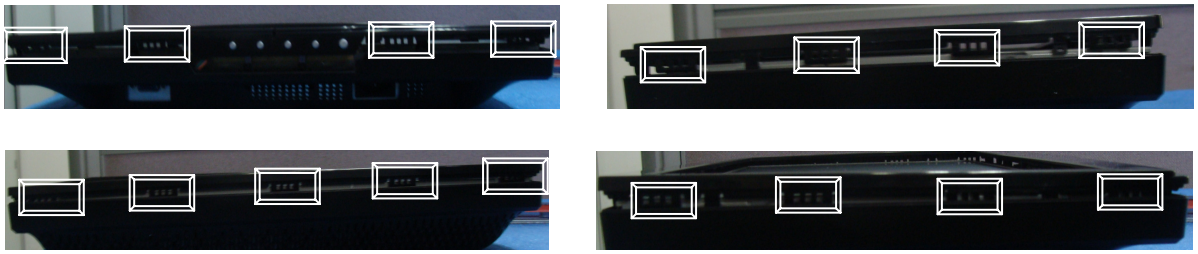
10. Mechanical Instructions

1. Place the monitor face down on a smooth surface .Be careful to avoid scratch and injury during the process of uninstall.

2. Remove three screws to remove the STAND-BASE ASS'Y.

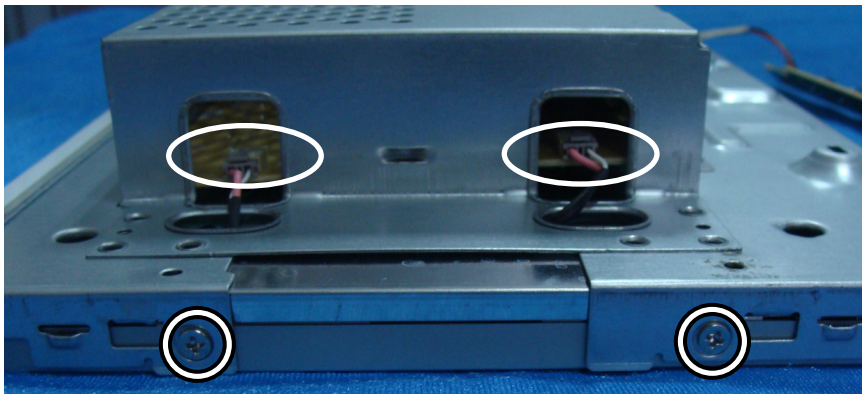


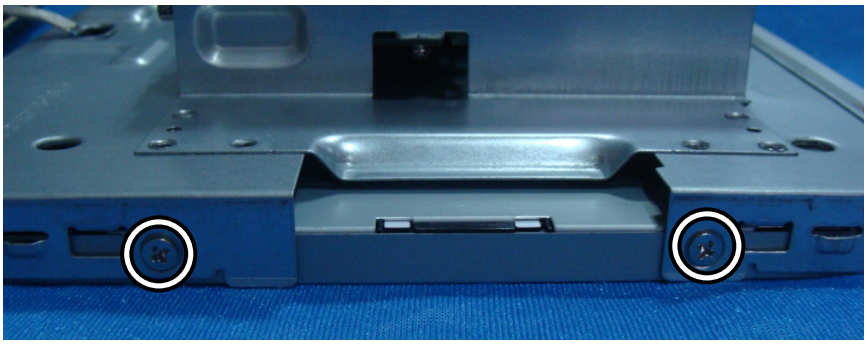
3. Use disassembly tool to open 4 latches at bottom, 4 latches at left, 5 latches at top and 4 latches at right of bezel, and remove bezel.



4. Remove main frame.

A. Disconnect two connectors and four screws.



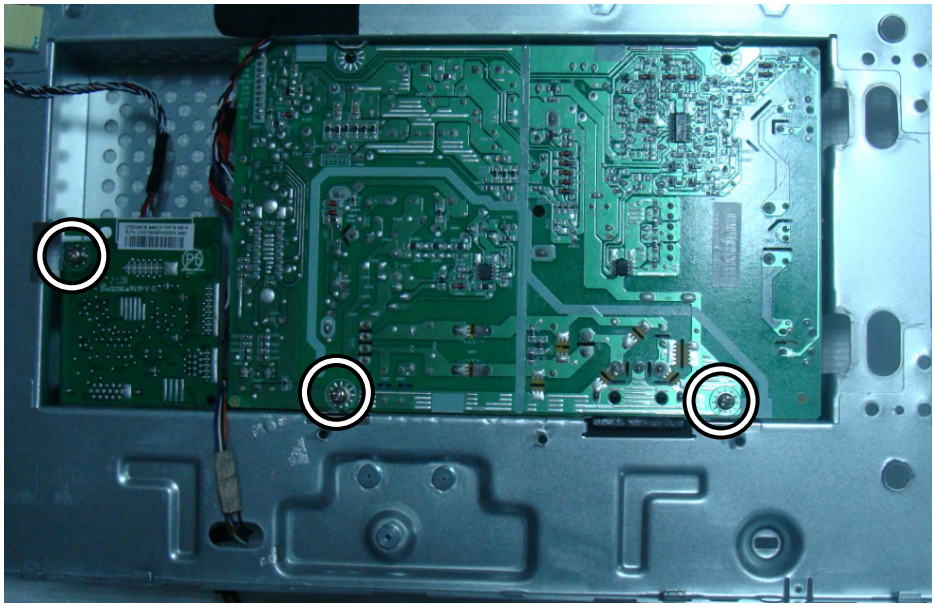


B. Press to release left and right latches of LVDS cable, and then disconnect it.

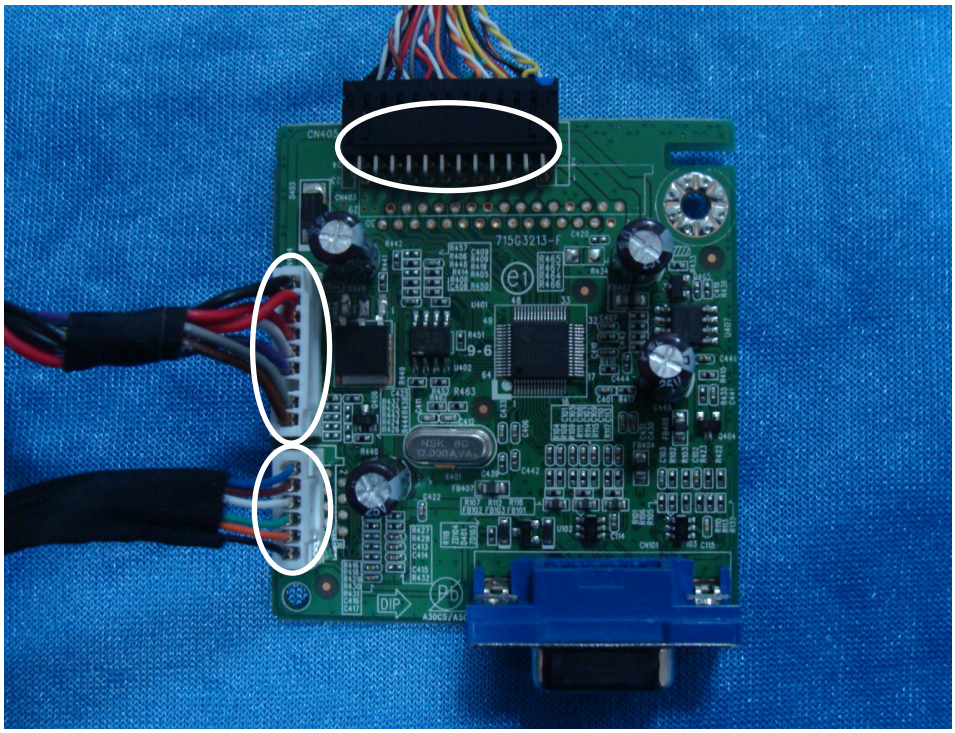
5. Remove Power Board and Main Board.

A. Remove two screws.

B. Remove three screws to remove the Power Board and Main Board from Main Frame.



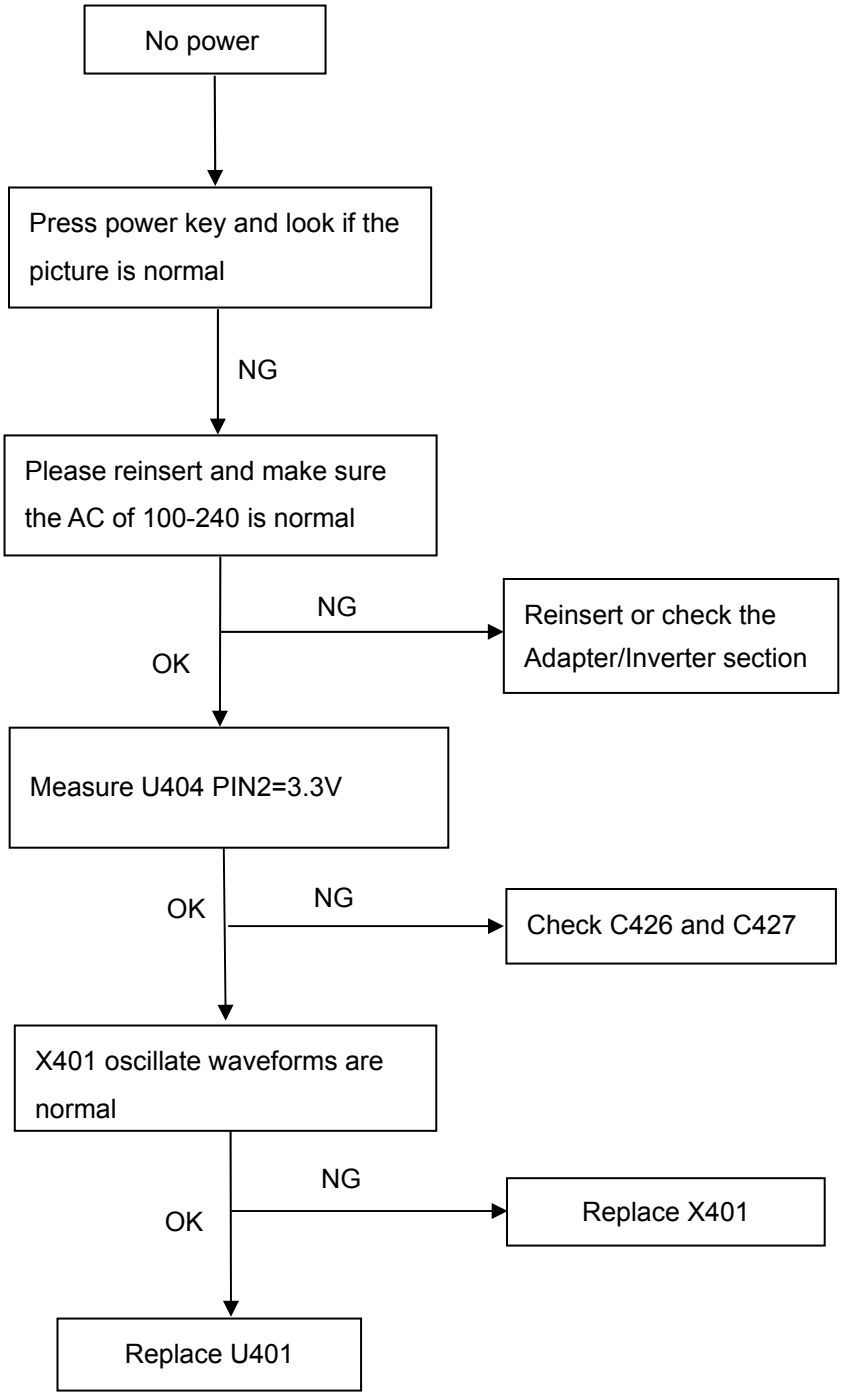
C. Disconnect three connectors from Main Board.



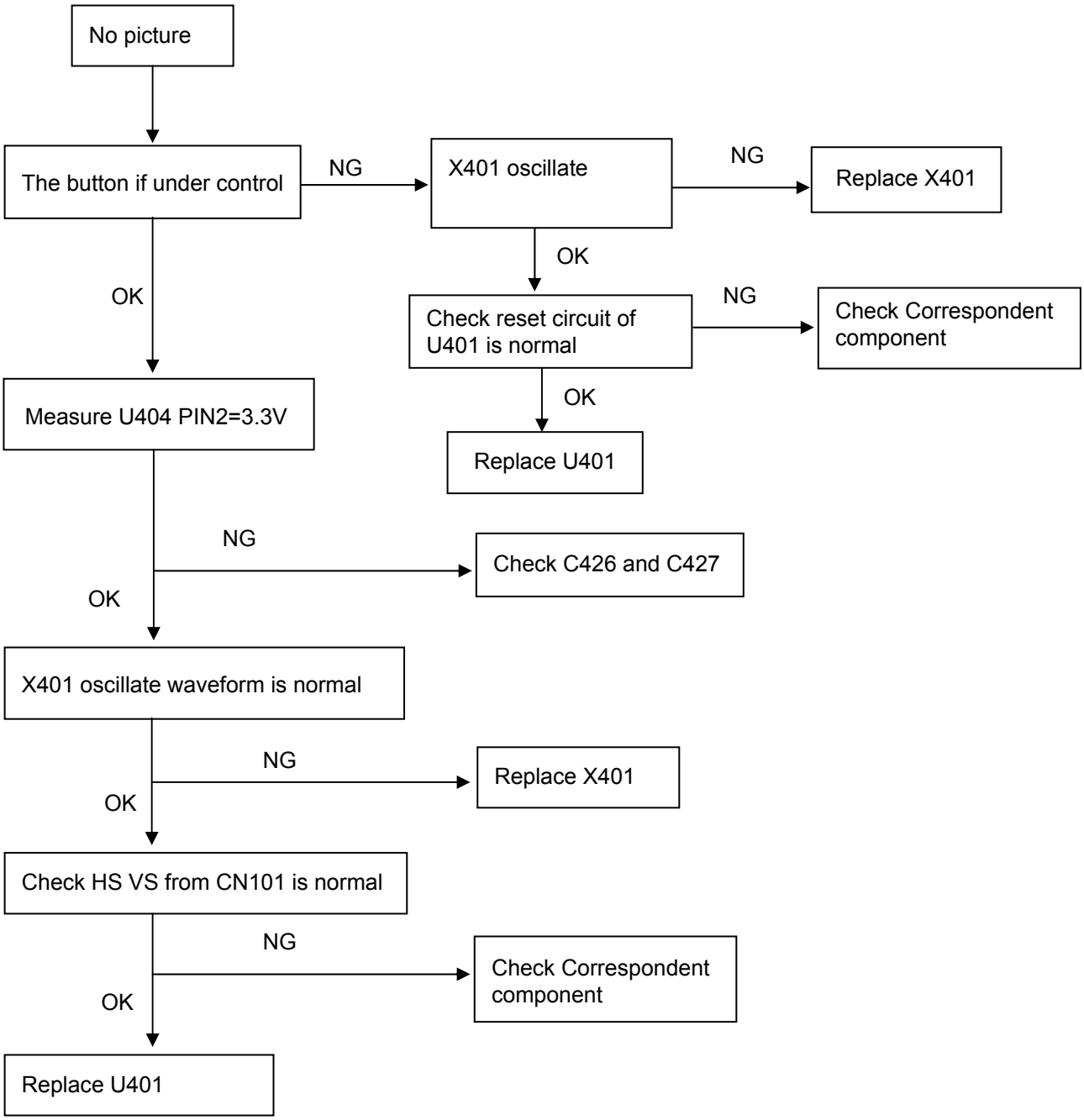
11. Repair Flow Chart

11.1 Main Board

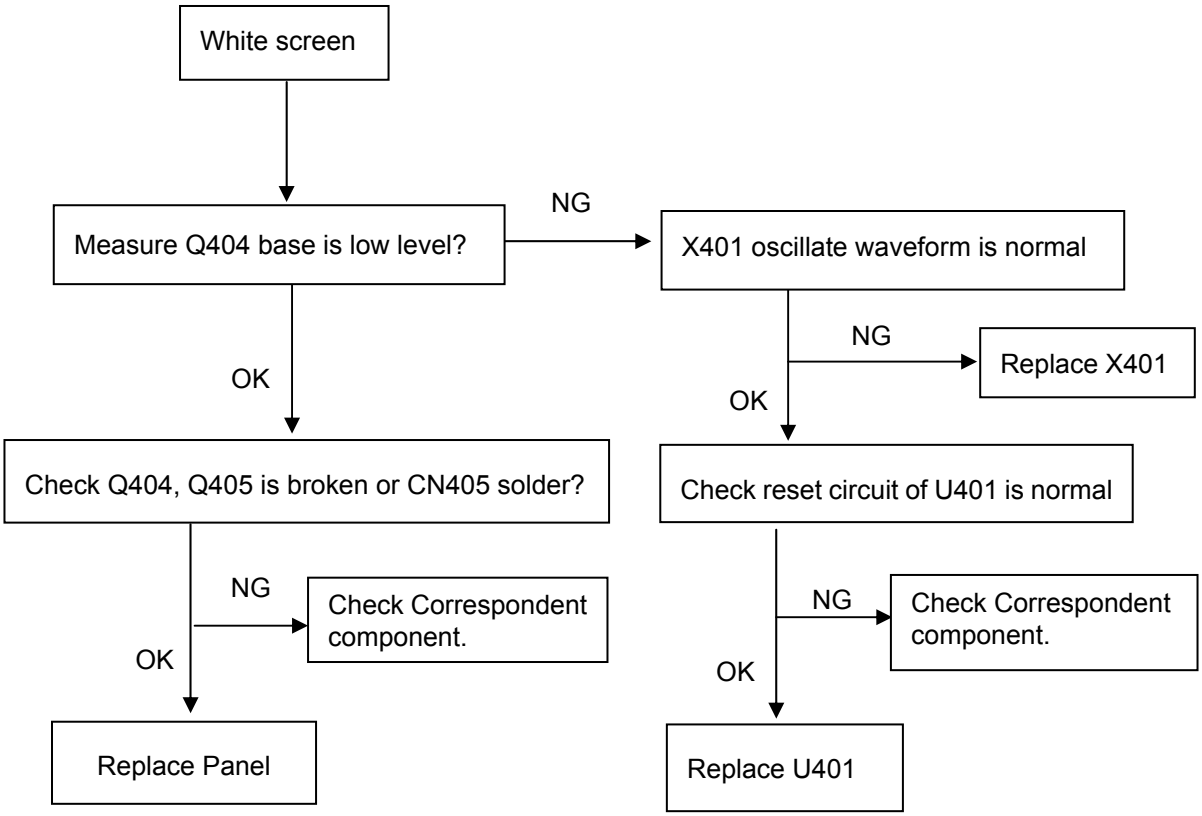
(1). No Power



(2). No Picture

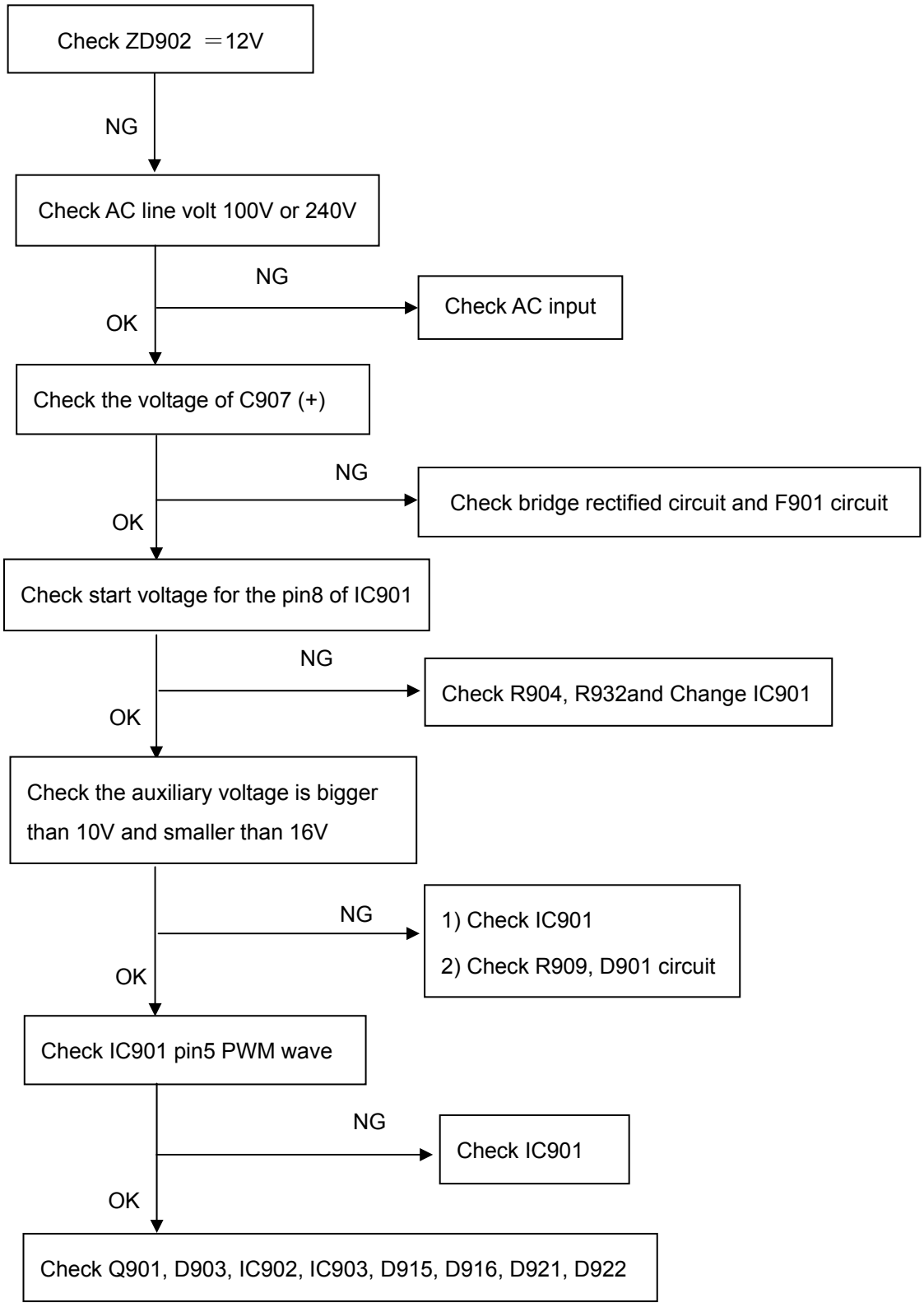

No picture
The button if under control
NG
X401 oscillate
NG
Replace X401
OK
OK
Check reset circuit of U401 is normal
NG
Check Correspondent component
OK
Measure U404 PIN2=3.3V
Replace U401
NG
Check C426 and C427
OK
X401 oscillate waveform is normal
NG
Replace X401
OK
Check HS VS from CN101 is normal
NG
Check Correspondent component
OK
Replace U401

(3). White screen

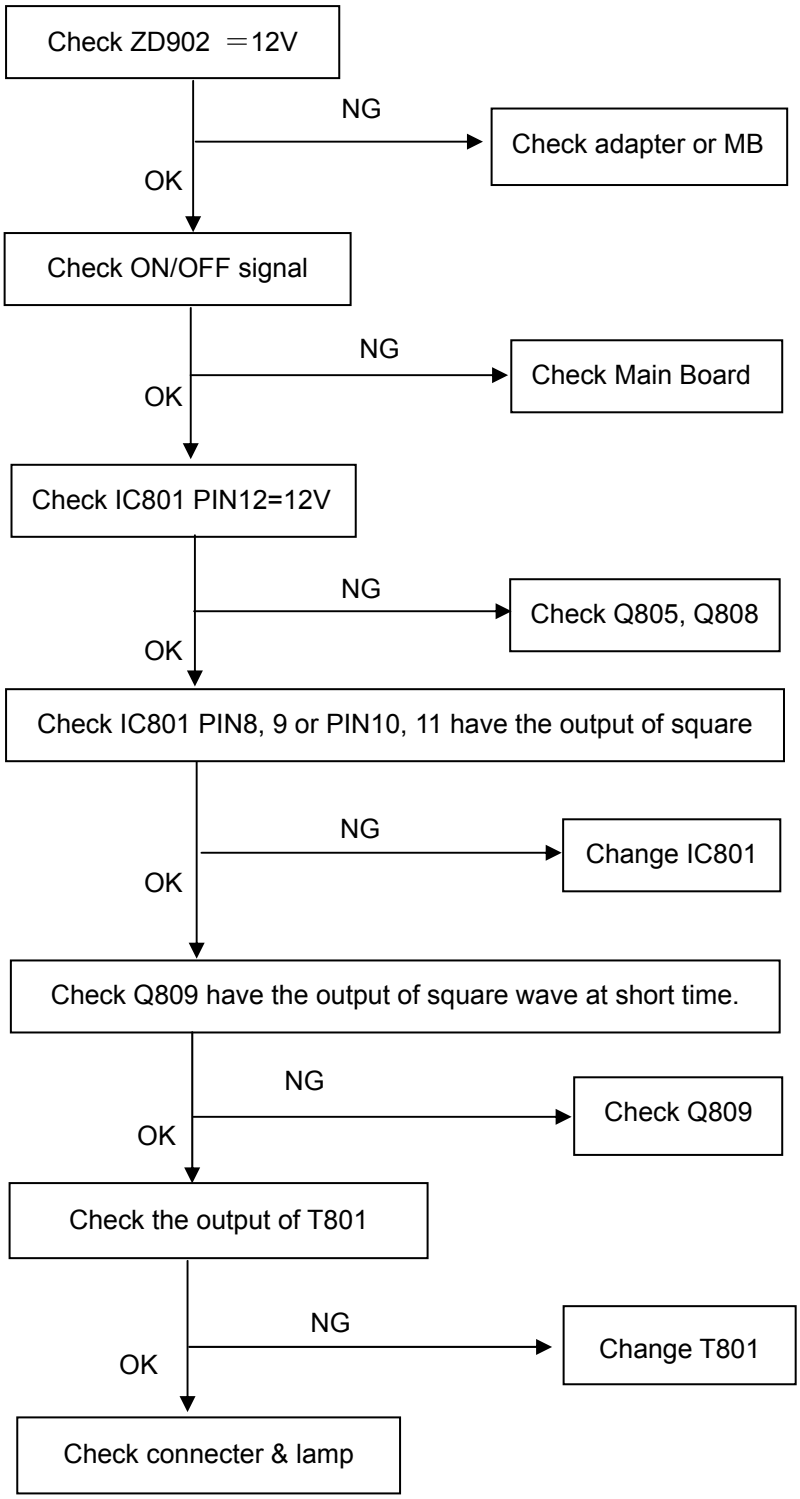


11.2. Power/Inverter Board

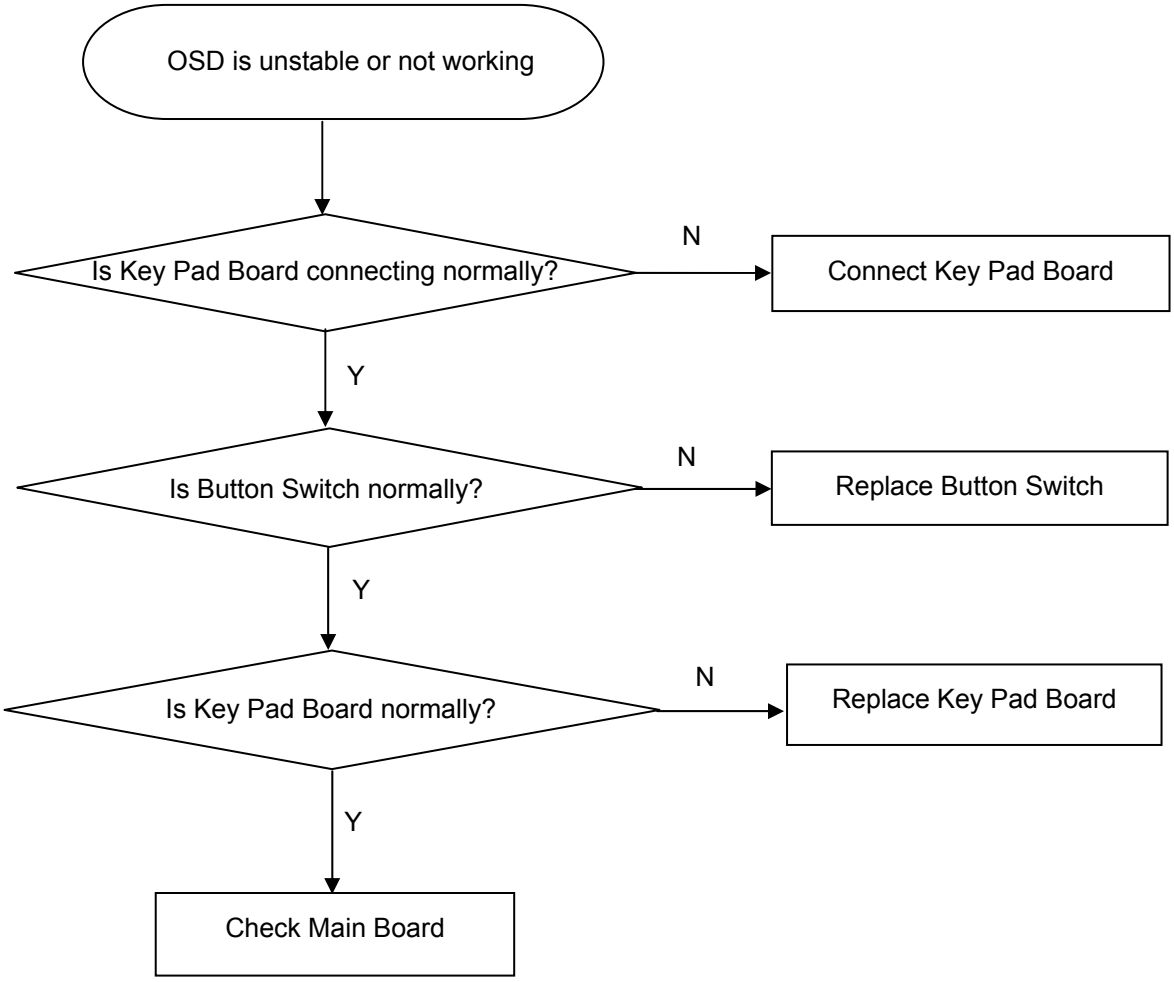
(1) No power



(2) W / LED, No Backlight



11.3 Key Board



12. ISP Instruction

When do the parts, need the tools as follow:

A. An i486 (or above) personal computer or compatible.

B. Microsoft operation system Windows 95/98/2000/XP.

C. “EasyUSB WriterV4.1” program

D. Software ISP SN Alignment kits

The kit contents:

a. ISP BOARD x1

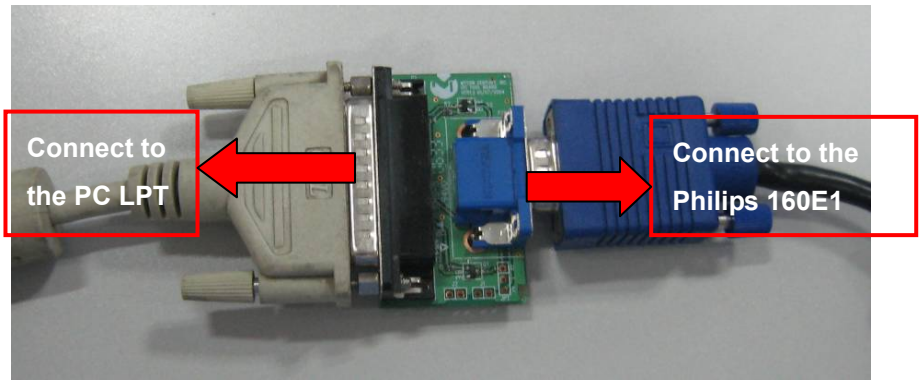
b. Printer cablex1

c. VGA cable x1

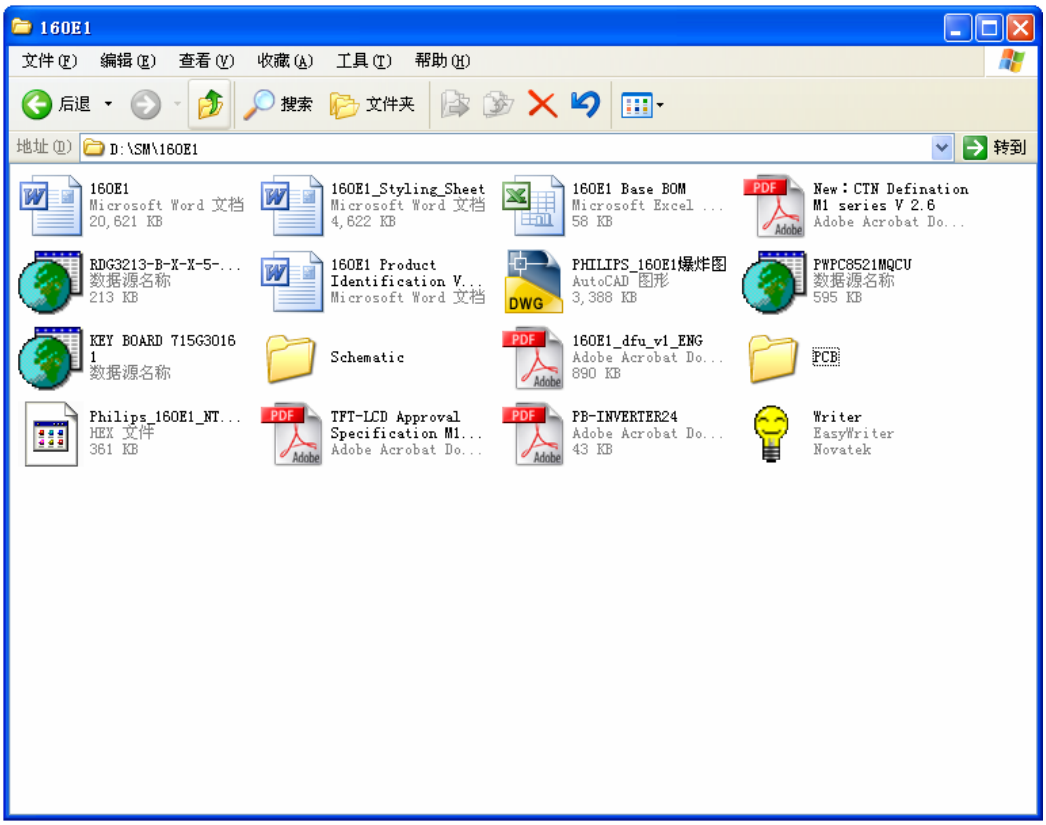
12.1 Install the “EasyUSB WriterV4.1”

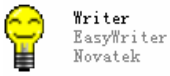
EasyUSB WriterV4.1.exe .

12.2 Connect the ISP board as follow:

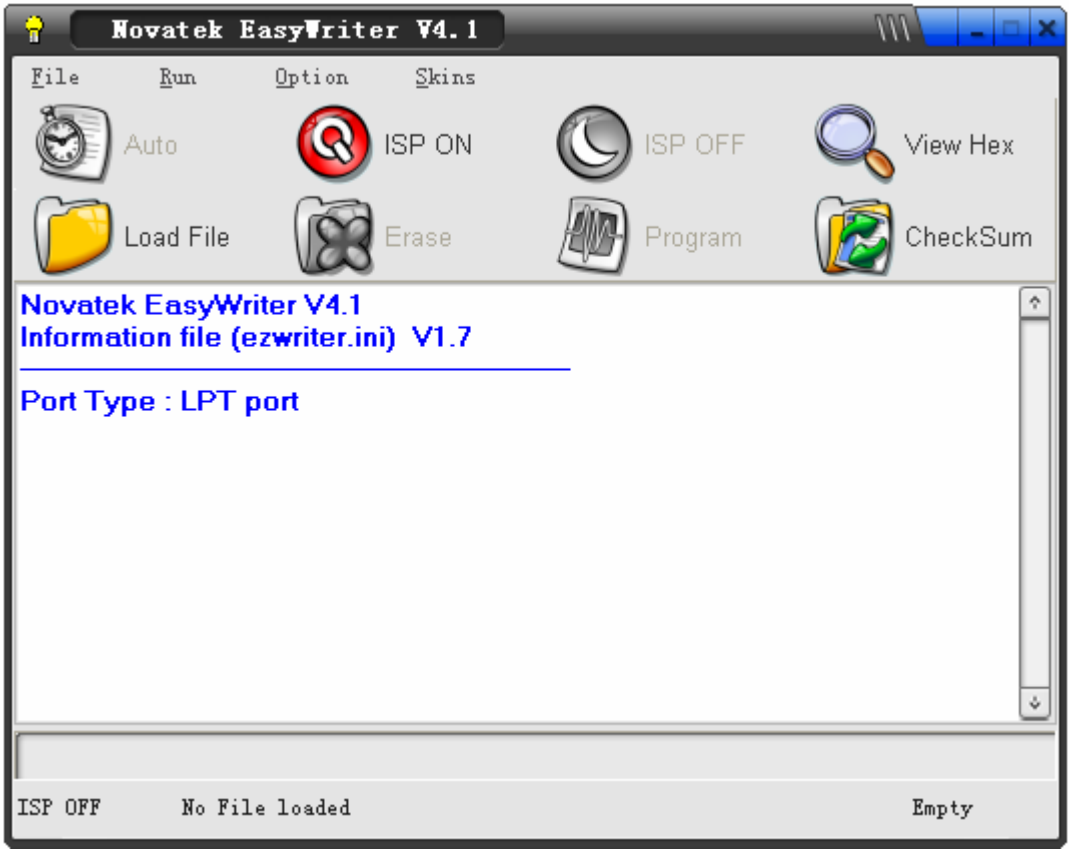


12.3 The process of ISP write is as follows.



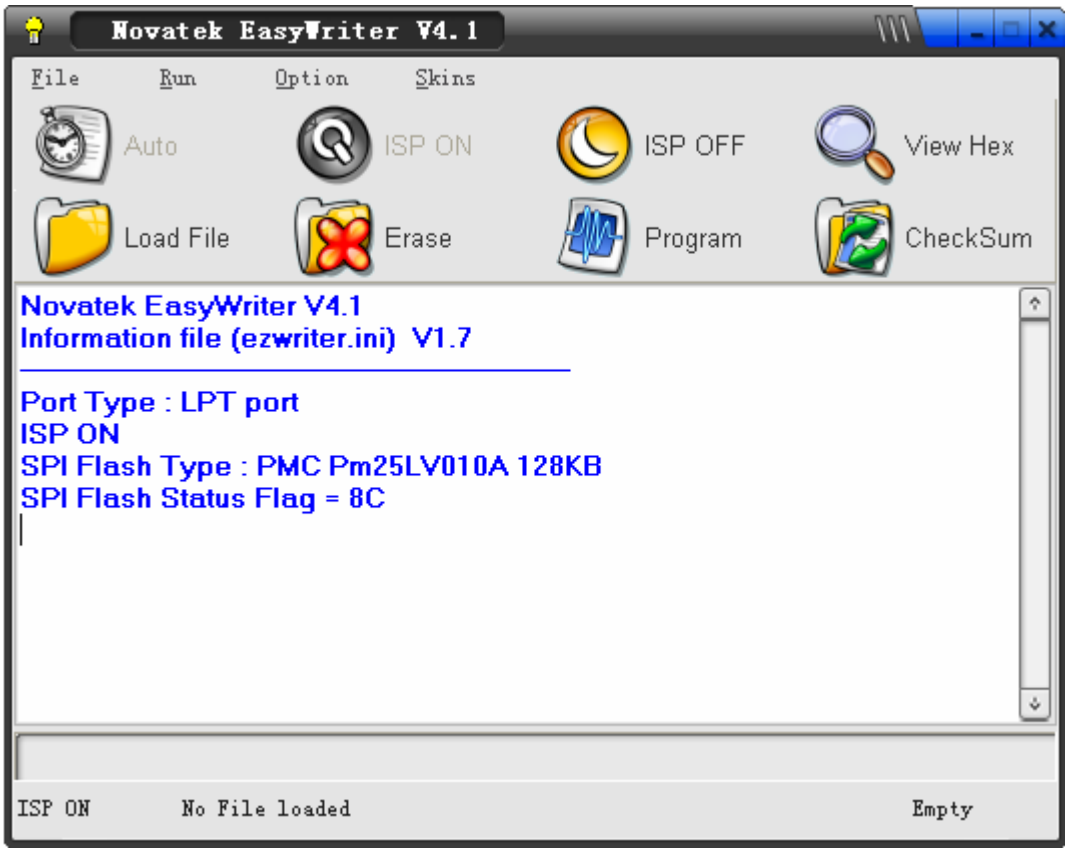
a) Double-click 

, running the program as follows:



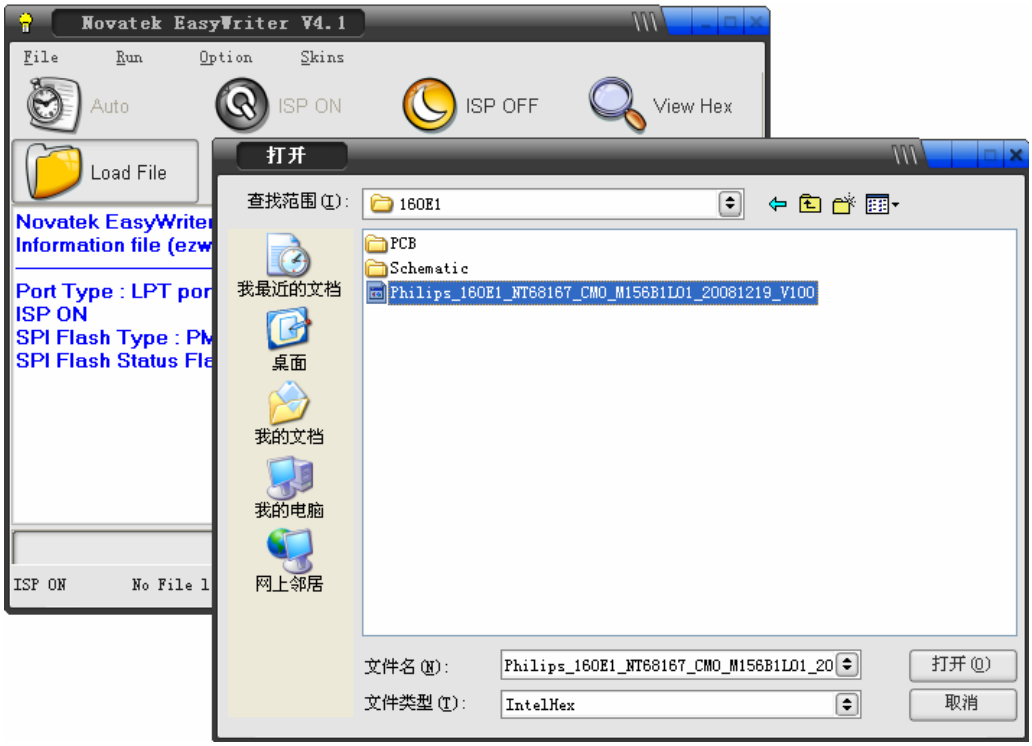
b) Click

icon and the program runs as follows:



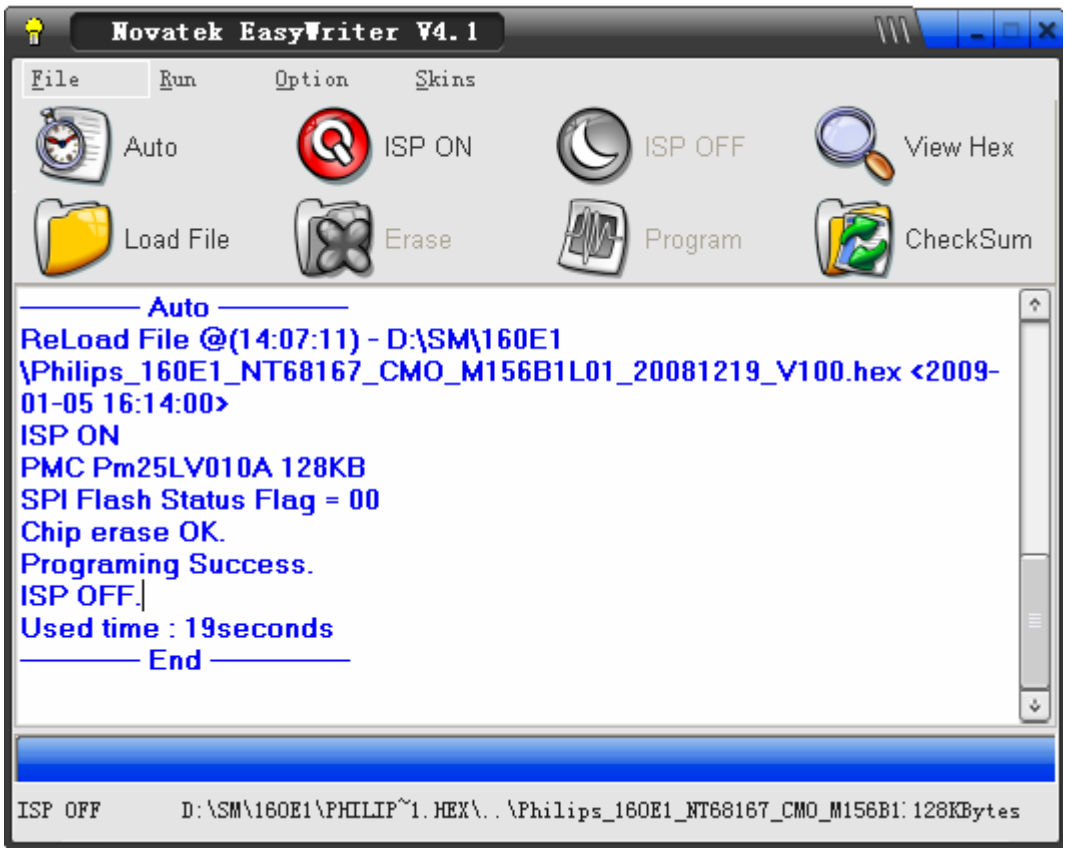
c) Click

icon, search the program “Philips_160E1_NT68167_CMO_M156B1L01_20081219_V100”, and click open:



d) Click

icon. If it burns successfully, it will show as the follow picture:



13. DDC Instruction

General

DDC Data Re-programming

In case the main EEPROM with Software DDC which store all factory settings were replaced because a defect, repaired monitor' the serial numbers have to be re-programmed.

It is advised to re- soldered the main EEPROM with Software DDC from the old board onto the new board if circuit board have been replaced, in this case the DDC data does not need to be re-programmed.

Additional information about DDC (Display Data Channel) may be obtained from Video Electronics Standards Association (VESA). Extended Display Identification Data (EDID) information may be also obtained from VESA.

1. An i486 (or above) personal computer or compatible.
2. Microsoft operation system Windows 95/98/2000/XP.
3. "PORT95NT.exe, WinDDC" program.
4. Software OSD SN Alignment kits

The kit contents:

a. OSD SN BOARD x1

b. Printer cablex1

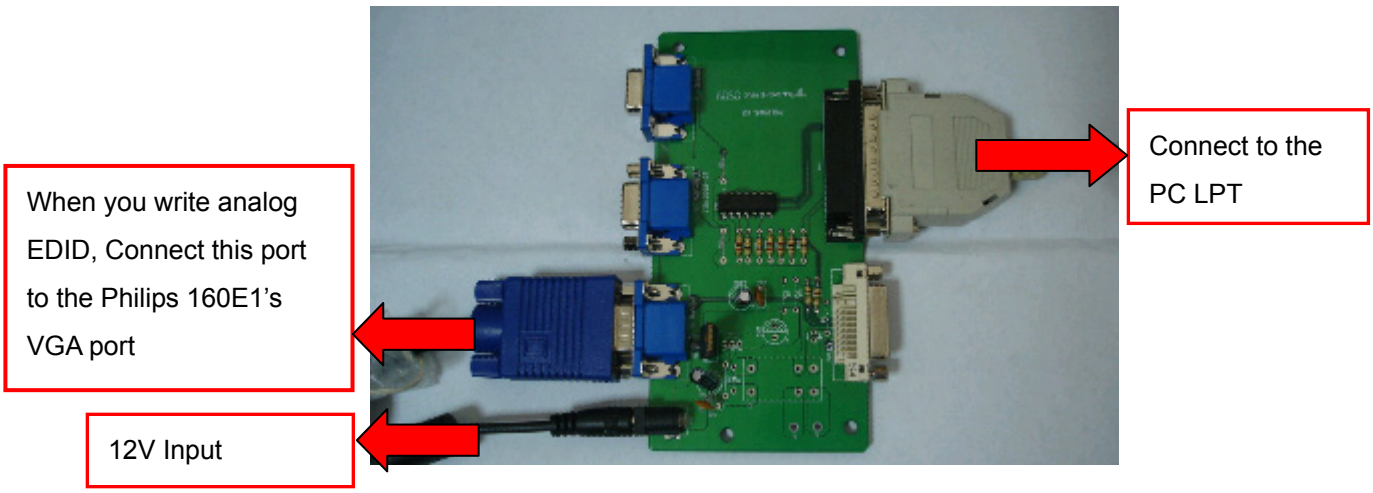
c. VGA cable x1

d. 12V DC power source

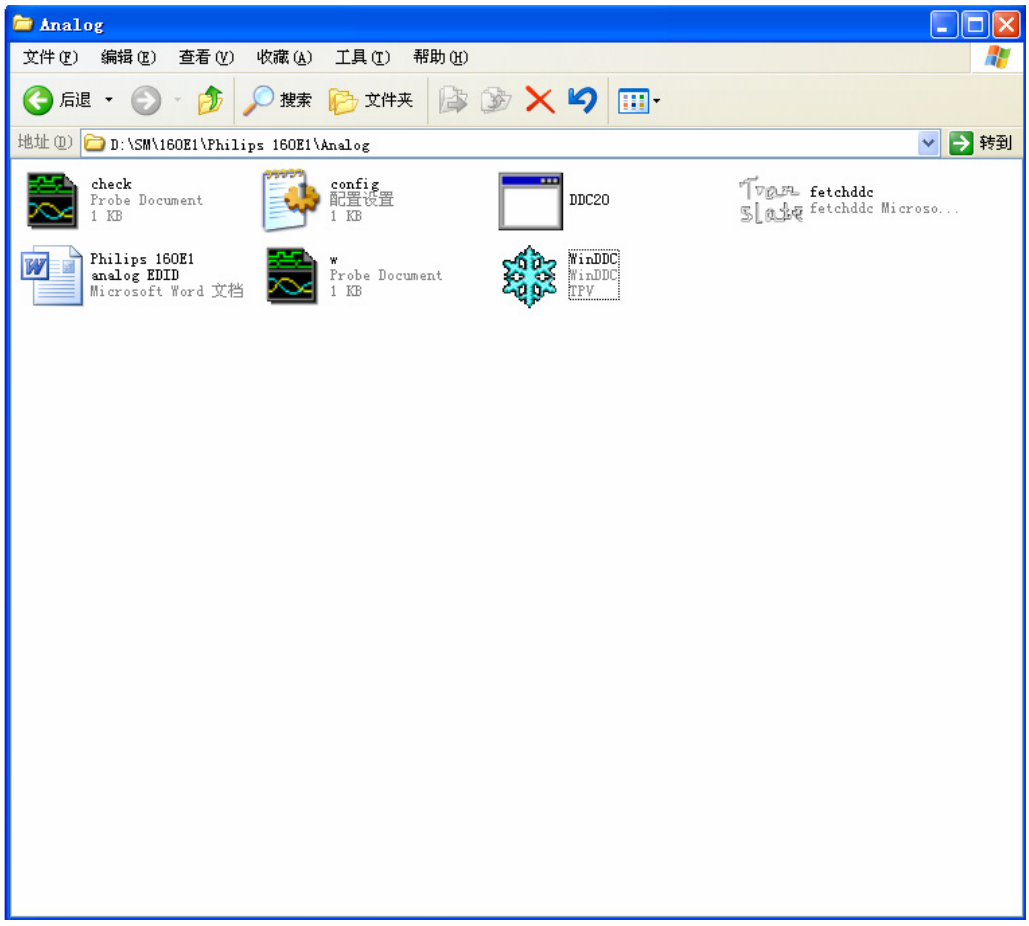
13.1. Install the "PORT95NT.EXE", and restart the computer.

The process of installing "PORT95NT" has been specified in, so it will not be specified again. If you have any problem, please read it.

13.2 Connect the DDC Board as follow:

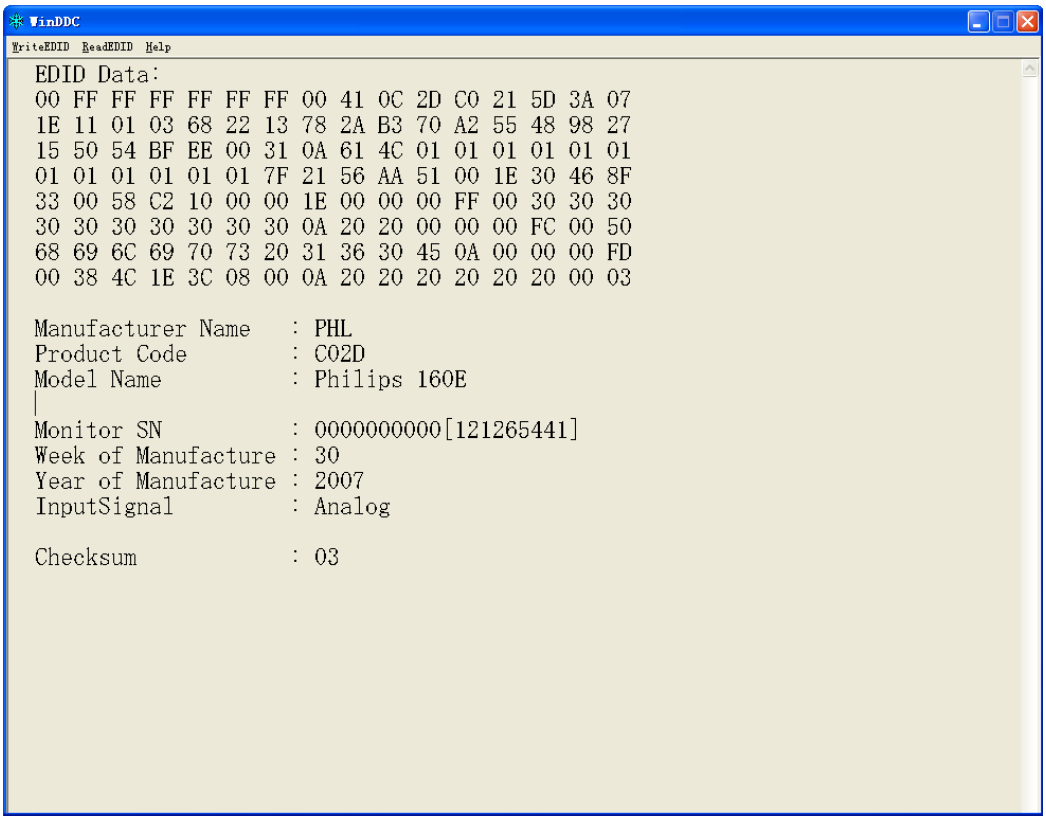


Take analog DDC write for example, as follow

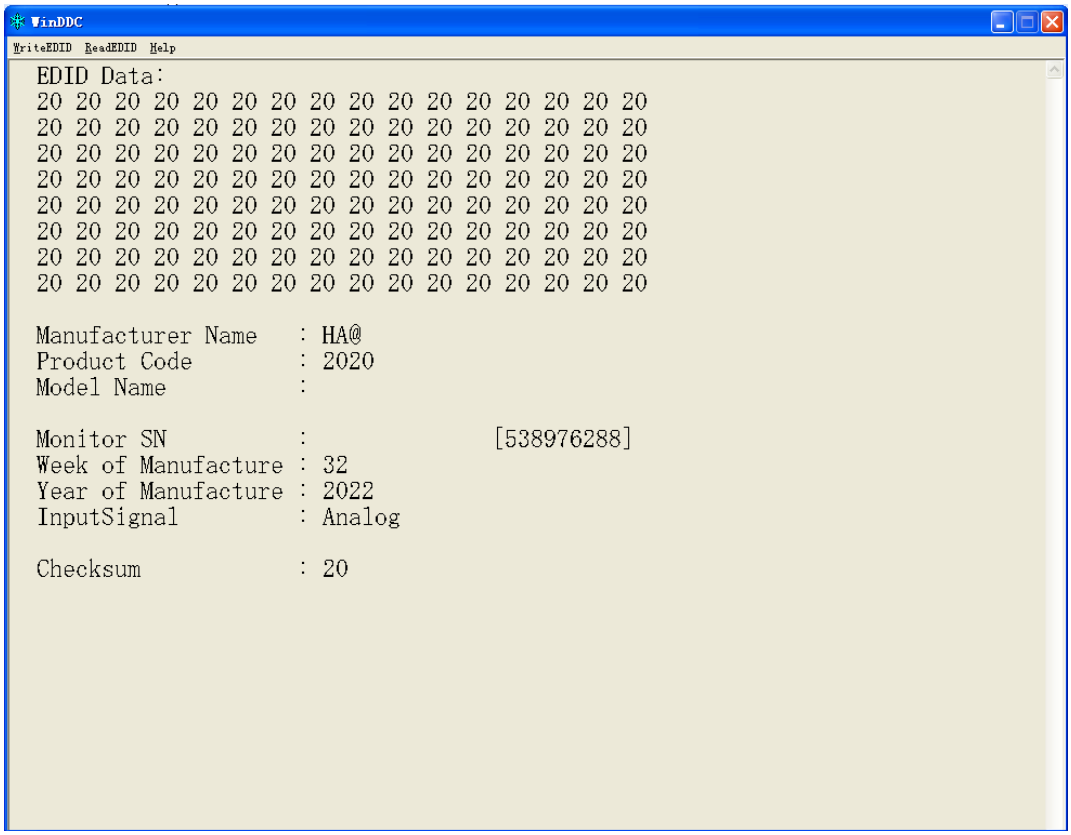


a. Double-click

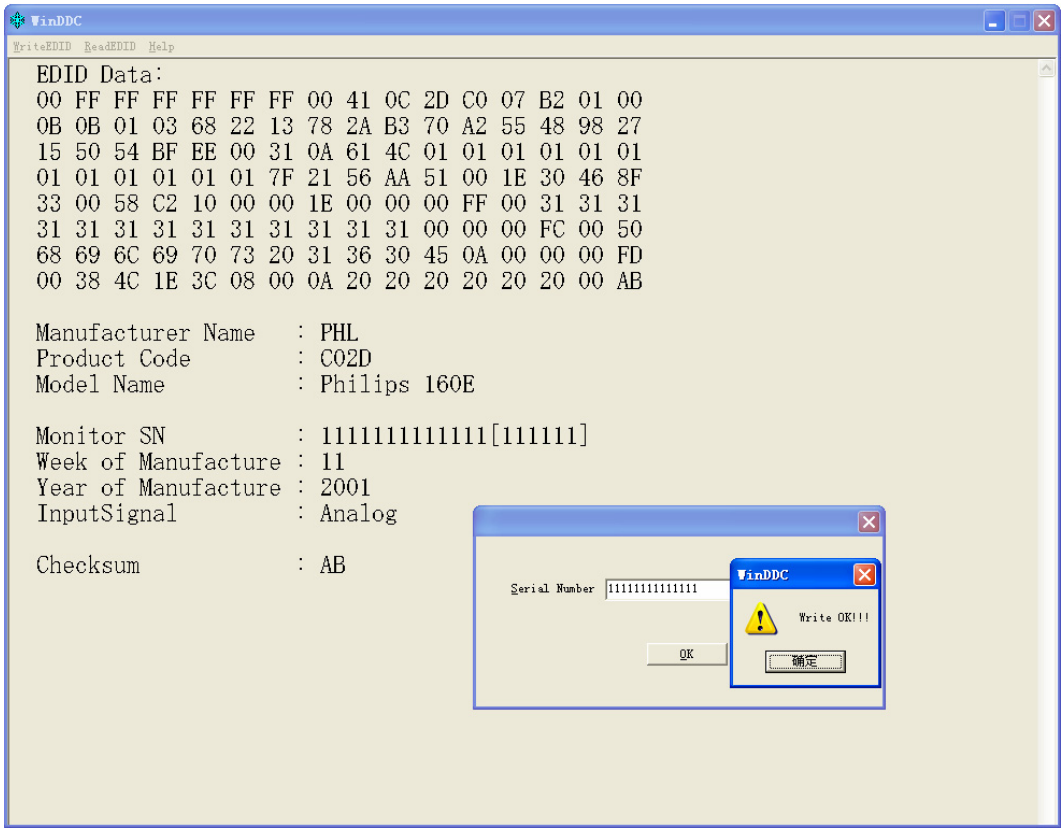
，appear as follow Figs：



b. Click ReadEDID



c. Click WriteEDID, and key in 14 numbers in the Serial Number Blank, then click “OK”, Now analog DDC Write complete, as follow:



160E1 EDID

128 bytes EDID Data (Hex):

x0 x1 x2 x3 x4 x5 x6 x7 x8 x9 xA xB xC xD xE xF

0: 00 FF FF FF FF FF FF 00 41 0C 2D C0 B8 B6 01 00
10: 17 0B 01 03 68 22 13 78 2A B3 70 A2 55 48 98 27
20: 15 50 54 BF EE 00 31 0A 61 4C 01 01 01 01 01 01
30: 01 01 01 01 01 01 7F 21 56 AA 51 00 1E 30 46 8F
40: 33 00 58 C2 10 00 00 1E 00 00 00 FF 00 31 32 33
50: 33 31 32 33 31 31 32 33 31 32 00 00 00 FC 00 50
60: 68 69 6C 69 70 73 20 31 36 30 45 0A 00 00 00 FD
70: 00 38 4C 1E 3C 08 00 0A 20 20 20 20 20 20 00 DE

Decoded EDID data

<---Header--->

Header: 00 FF FF FF FF FF FF 00

<-x-Header-x->

<---Vendor/Product Identification--->
ID Manufacturer Name: PHL
ID Product Code: C02D
ID Serial Number: b8b60100
Week of Manufacture: 23
Year of Manufacture: 2001
<-x-Vendor/Product Identification-x->

<---EDID Structure Version/Revision--->
EDID Version#: 01
EDID Revision#: 03
<-x-EDID Structure Version/Revision-x->

<---Basic Display Parameters/Features--->
Video i/p definition: Analog
Signal Level Standard: 0.700V/0.000V (0.700Vpp)
Setup: Blank-to-Black not expected
Separate Sync Support: Yes

Composite Sync Support: No

Sync. on green video supported:No

Serration of the Vsync.Pulse is not required.

Max. H. Image Size: 34cm.

Max. V. Image Size: 19cm.

Display Gamma: 2.2

DPMS Features, Stand-by:No.

DPMS Features, Suspend: No.

DPMS Features, Active off: Yes.

Display Type: R.G.B color display.

Standard Default Color Space: R.G.B color.

Preferred Timing Mode: In First Detailed Timing.

GTF supported: No.

<---Basic Display Parameters/Features--->

<---Color Characteristics--->

Red x: 0.6347656250

Red y: 0.3349609375

Green x: 0.2822265625

Green y: 0.5966796875

Blue x: 0.1533203125

Blue y: 0.0849609375

White x: 0.3125000000

White y: 0.3281250000

<-x-Color Characteristics-x->

<---Established Timings--->

Established Timings 1: BF

-720x400 @70Hz VGA, IBM

-640x480 @60Hz VGA, IBM

-640x480 @67Hz Apple, Mac II

-640x480 @72Hz VESA

-640x480 @75Hz VESA

-800x600 @56Hz VESA

-800x600 @60Hz VESA

Established Timings 2: EE

-800x600 @72Hz VESA

-800x600 @75Hz VESA

-832x624 @75Hz Apple, Mac II

-1024x768 @60Hz VESA

-1024x768 @70Hz VESA

-1024x768 @75Hz VESA

Established Timings 3: 00

<-x-Established Timings-x->

<---Standard Timing Identification--->

-640x400 @70 Hz

-1024x768@72 Hz

<-x-Standard Timing Identification-x->

<---Detailed Timing Descriptions--->

Detailed Timing: 1366x768 @ 60Hz

<-x-Detailed Timing Descriptions-x->

<---Detailed Timing Descriptions--->

Detailed Timing: FF (Monitor SN) '123312311231'

Detailed Timing: FC (Monitor Name) 'Philips 160E'

Detailed Timing: FD (Monitor limits)

Min. V. rate: 56Hz

Max. V. rate: 76Hz

Min. H. rate: 30 KHz

Max. H. rate: 60 KHz

Max. Pixel Clock: 80MHz

<-x-Detailed Timing Descriptions-x->

Extension Flag: 00

Checksum: DE

14. White Balance, Luminance Adjustment

1. Apparatuses and program: analyzer CA-210, PC, tool, FGA adjustment program (PHILIPS 160E.DDCI), Pattern generator.

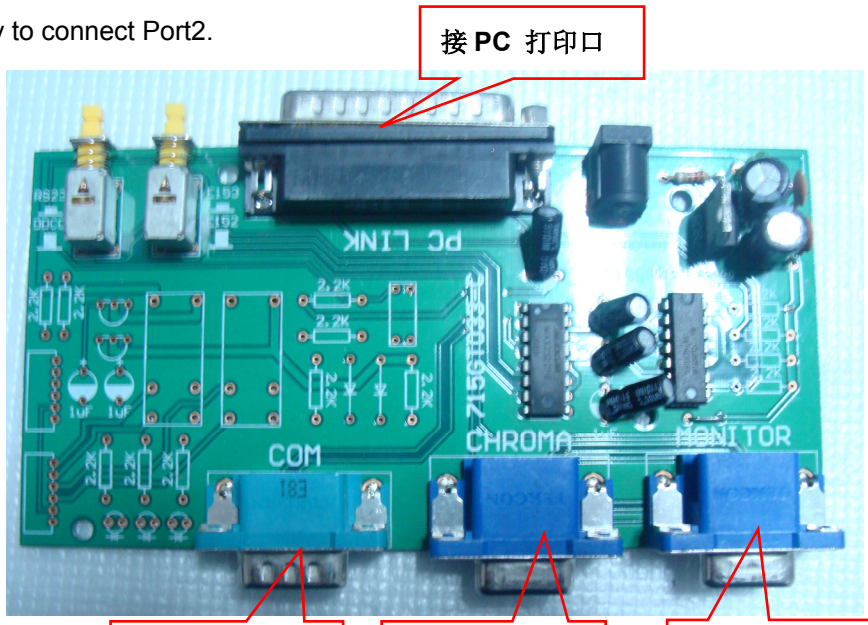
2. Equipment installation:

a. Connect analyzer CA-210 to PC by USB connector, install drive program CA-SDK Ver4.00 for CA-210 and restart PC after finish installing

b. Install Port95NT drive program, set PC printer connector mode as ECP mode and reset PC after finish installing.

c. Connect tool as follow:

Note: It's not necessary to connect Port2.



3. Adjustment

Preparation before adjustment:

a. Monitor should be warmed up for more than half an hour.

b. Make sure that the tools are connected right and drive programs have been installed OK.

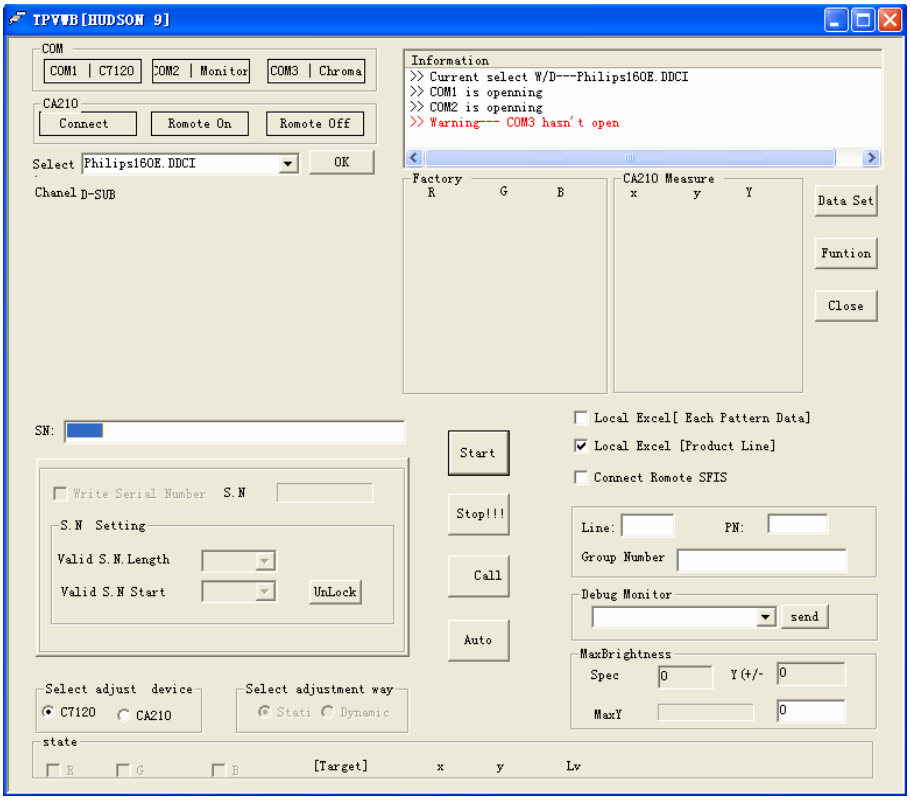
Adjustment process:

a. Press the power of CA-210, shut off the lens, press 0-Cal and open the lens after analyzer reset.

b. Open white balance adjustment program, select the right parameter according with the program and click OK.

c. Make sure that the lens of CA-210 aims at the center of the screen, then click START to adjust.

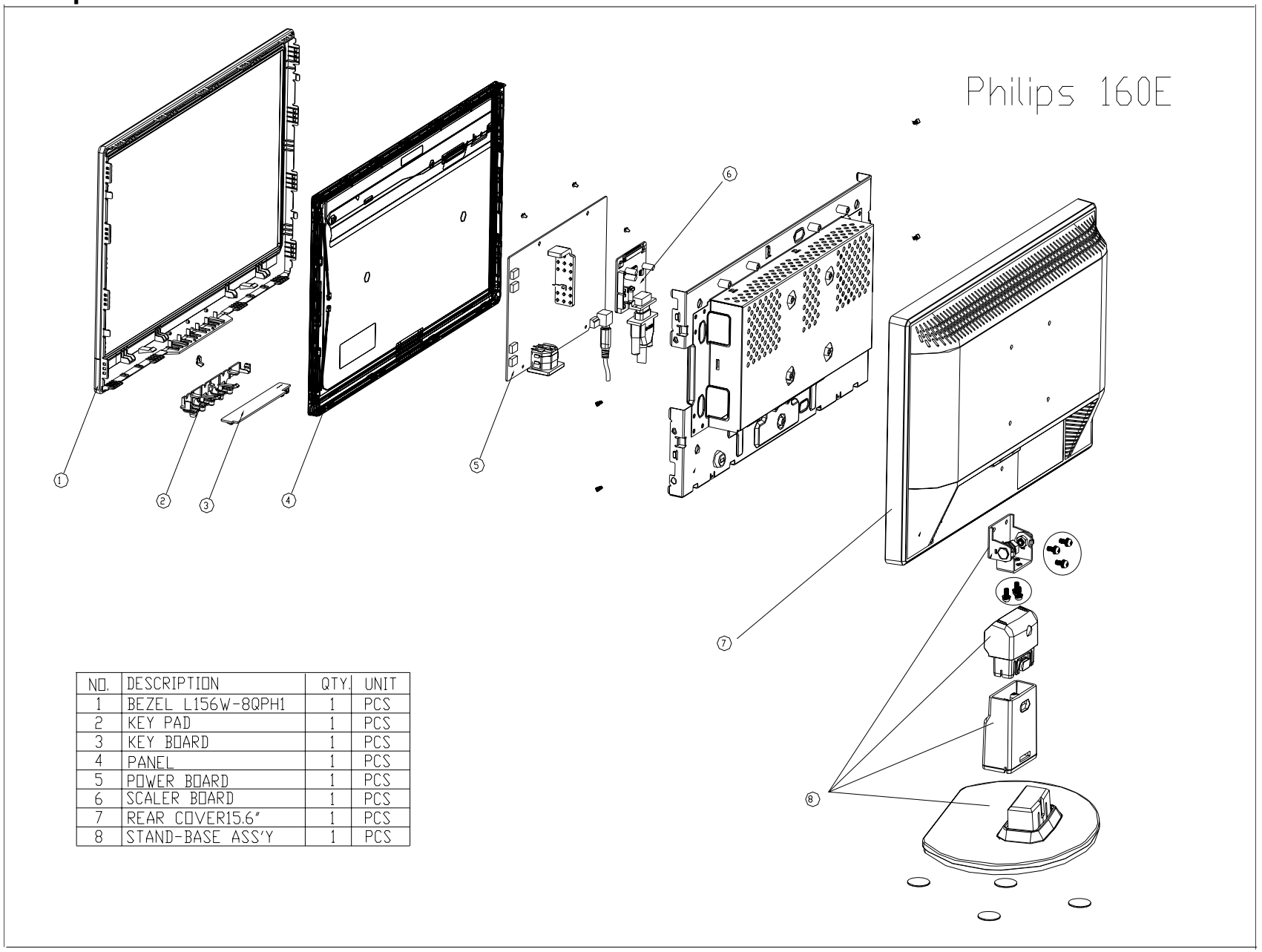
d. After finish adjusting, the adjustment program displays pass, and the START button changes for NEXT, which means that you can adjust another monitor.



4. Color Temp confirmation

Connect the signal to the monitor, the monitor displays white-picture, use CA-210 to measure the Color Temp of the screen center and select the OSD to make sure whether the Color Temps accord with the SPEC.

15. Monitor Exploded View



NO.	DESCRIPTION	QTY.	UNIT
1	BEZEL L156W-8QPH1	1	PCS
2	KEY PAD	1	PCS
3	KEY BOARD	1	PCS
4	PANEL	1	PCS
5	POWER BOARD	1	PCS
6	SCALER BOARD	1	PCS
7	REAR COVER15.6"	1	PCS
8	STAND-BASE ASS'Y	1	PCS

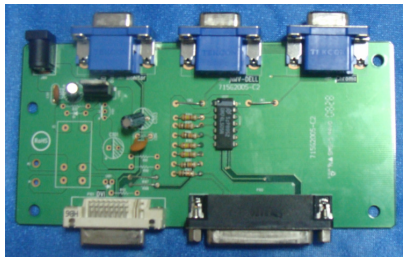
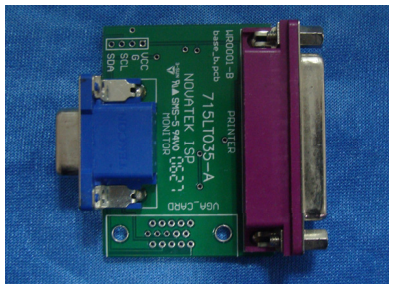
16. Recommended & Spare Parts List

160E1SB/93

Item	Location	Philips 12NC	PCM Codes	Description	Remark
1	FQ106		Q34G0551AFLA1B0130	BEZEL L156W-8QPH1	
2	FQ405		Q33G0170AFL 1L0100	KEY PAD	
3	FQ004		KEPC7QV9	KEY BOARD ASSY	
4	FQ001		750GLM156B1112M0PH	PANEL M156B1-L01 C1 NB CMO	
5	FQ003		PWPC8521MQCU	POWER BOARD ASSY	
6	FQ002		756GQ8CB PH004	SCALER BOARD（CBPCRNFPHQ2）	CMO
7	FQ105		Q34G0274AFL 2B0100	REAR COVER15.6"	
8	FQ103		705GQ834603	15.6"PHILIPS STAND-BASE ASS'Y	
	E08902		089G 725CAA DB	D-SUB CABLE	
	FQ301		089G414A15N IS	POWER CORD	
	FQ303		095G8018 3DH45	LVDS CABLE 30P-24P 120mm	
	FQ205		705GQ9CS001	CUSHION ASSY	
	FQ202		Q44G6004813 2A	15.6LCD PHILIPS CARTON	
	FQ206		Q41G780A81319A	160E QSG	
	FQ204		Q70G1608813 2A	160E CD MANUAL	
	IC902		056G 139 7 1	IC EL817MA M-TYPE	
	T901		080GL19T 26 T	X'FMR 610uH SRW24LQL-T15H016	
	T801		S80GL17T40V	TRANSFORMER ASS'Y	
	IC801		056G 379 22	IC TL494IDR SOIC-16	
	IC901		056G 379107	IC LD7575A PS SOP-8	
	IC903		056G 158 10 T	IC AS431AZTR-E1 TO-92	
	F901		084G 56 3 B	FUSE 3.15A 250V	
	X401		093G 2251B J	NXS12.000AC30F-BT-2	

	U401		056G 562573	IC NT68167FG QFP64	
	U404		056G 563 52	IC AP1117D33L-13 TO252-3L	
	U102		056G 662 13	IC AZC099-04S SOT23-6L	
	U103		056G 662 13	IC AZC099-04S SOT23-6L	
	U402		100GPNM6000NT1	MCU ASSY(056G1133713)	CMO

Service Kit

Description	Part No.	Philips 12NC	Picture
DDC KIT	715G2005C2	996500043197	
NOVATEK ISP KIT	715LT035A	996500043198	

17. Different Parts List

Diversity of 160E1SB/97 compared with 160E1SB/93						
160E1SB/97				160E1SB/93		
Location	**Philips 12NC**	**PCM Codes**	**Description**	**Philips 12NC**	**PCM Codes**	**Description**
FQ301		089G404A15N IS	POWER CORD		089G414A15N IS	POWER CORD
FQ202		Q44G6004813 1A	15.6 LCD PHILIPS CARTON		Q44G6004813 2A	15.6LCD PHILIPS CARTON

Diversity of 160E1SB/00 compared with 160E1SB/93						
160E1SB/00				160E1SB/93		
Location	**Philips 12NC**	**PCM Codes**	**Description**	**Philips 12NC**	**PCM Codes**	**Description**
FQ301		089G404A15N IS	POWER CORD		089G414A15N IS	POWER CORD
FQ202		Q44G6004813 1A	15.6 LCD PHILIPS CARTON		Q44G6004813 2A	15.6LCD PHILIPS CARTON

Diversity of 160E1SB/05 compared with 160E1SB/93						
160E1SB/05				160E1SB/93		
Location	**Philips 12NC**	**PCM Codes**	**Description**	**Philips 12NC**	**PCM Codes**	**Description**
FQ301		089G410A15N IS	POWER CORD		089G414A15N IS	POWER CORD
FQ202		Q44G6004813 1A	15.6 LCD PHILIPS CARTON		Q44G6004813 2A	15.6LCD PHILIPS CARTON

Diversity of 160E1SB/62 compared with 160E1SB/93						
160E1SB/62				160E1SB/93		
Location	**Philips 12NC**	**PCM Codes**	**Description**	**Philips 12NC**	**PCM Codes**	**Description**
FQ301		089G404A15N IS	POWER CORD		089G414A15N IS	POWER CORD
FQ202		Q44G6004813 1A	15.6 LCD PHILIPS CARTON		Q44G6004813 2A	15.6LCD PHILIPS CARTON

18. General Product Specification

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1. FOREWORD

This specification describes a 15.6” WXGA multi-scan color TFT LCD monitor with maximum resolution up to 1366*768/60Hz non-interlaced.

All optical characteristics (including White-D, Brightness and so on) are determined according to panel specification after warming up approximate 30 minutes that brightness stability is optimal, and follow strictly after panel specification.

2. PRODUCT PROFILE

This display monitor unit is a color display monitor enclosed in Philips styling cabinet which has an integrated tilt base.

LCD

Tier1: CMO

Type NR.	:M156B1-L01 (TN)
Outside dimensions	:363.8 (H) x 215.9 (V) x 14.3 (D)mm (Typ.)
Pitch (mm)	:0.252 * RGB (H) mm x 0.252 (V) mm
Color pixel arragnement	:RGB vertical stripes
Display surface	:Hard coating (3H), Anti-glare treatment of the front polarizer
Color depth	:16.7M colors
Backlight	:CCFL edge light system
Active area (W xH)	:344.23 (H) x 193.56 (V)
View angle	:Horizontal 170 (Typ.), Vertical 160 (Typ.)
Contrast ratio	:500:1 (Typ.)
White Luminace	:250 nits (Typ.)
Gate IC	:
Source IC	:
Response time	:5ms (Typ.)
MTBF	:50,000 Hrs

Scanning frequencies

Hor.	: 30 – 60 KHz
Ver.	: 56 - 76 Hz
Video dot rate	: <140 MHz
Power input	: 90-264 V AC, 50/60 ± 2 Hz
Power consumption	: < 28 W maximum

Functions:

D-SUB analog R/G/B separate inputs, H/V sync separated, Composite (H+V) TTL level, SOG sync

Ambient temperature: 0 °C - 40 °C

3. ELECTRICAL CHARACTERISTERS

Interface signal

D-sub analog

Input signal	:Video, Hsync, Vsync
Video	:0.7 Vp-p, input impedance, 75 ohm @DC
Sync:	Separate sync TTL level, input impedance 2.2K ohm terminate
	Hsync Positive/Negative
	Vsync Positive/Negative
	Composite sync TTL level, input impedance 2.2k ohm terminate
	(Positive/Negative)
Sync on green video	: 0.3 Vp-p Negative (Video 0.7 Vp-p Positive)

Interface

D-SUB cable

Length :1.5m +/- 50mm

Fix with monitor when packing with transplant pin protective cover.

Connector type :D-sub male with DDC2B pin assignments

Blue connector thumb-operated jack screws

Pin assignments

PIN No.	SIGNAL
1	Red
2	Green/ SOG
3	Blue
4	Sense (GND)
5	Cable Detect (GND)
6	Red GND
7	Green GND
8	Blue GND
9	DDC +3.3V or +5V
10	Logic GND
11	Sense (GND)
12	Bi-directional data
13	H/H+V sync
14	V-sync
15	Data clock

Software control functions via OSD/Control adjustment functions

Please refer to following Hudson 9 OSD definitions, if any deviation, there refer to PVT exit sample.

ITEM			
1	OSD DEFINITIONS	PHILIPS 160E1 OSD Definition-0810222.x	Reset - No: Exit Yes: Auto adjustment for displaying timing mode and recall factory preset
2	OSD LANGUAGES	H8 OSD translation - 20070425 - Final.xls H9 new item translation _ 2008041	9 LANGUAGES
3	OSD TREE	PHILIPS OSD Tree-081022.xls	
4	POWER ON LOGO	1366x768.bmp	Power On Logo: Power On → Show up Philips logo 3 seconds → Change to input signal. This picture is reference only. The official drawing will send out by PM.

Timing requirement

Factory Preset mode definition:

1. Perfect FOS while presenting those timings
2. Will specify those timing in User's Manual

Preset mode definition:

1. Need to support those timings
2. Perfect FOS after auto adjustment

User mode

1. Can save those timing that not in preset mode and can be showed (not over scalar or panel spec.)
2. It needs to reserve the 10 timings space in memory size.

Mode storing capacity

Factory preset modes : 08

User modes :23

Factory preset modes (8 modes)

- Factory modes and preset modes are defined in the enclosed timing table file

160E1 1366 768 Timming Table-0810

- Video timing mode (internal firmware support)

  60Hz: 480p/720p/1080i/1080p

  50Hz: 576p/720p/1080i/1080p

Horizontal scanning

Sync polarity :positive or negative

Scanning frequency :30-60KHz

Vertical scanning

Sync polarity :positive or negative

Scanning frequency :56-76Hz

Power input connection

Power cord length :1.5m

Power cord type :3 leads power cord with protective earth plug

Power management (supplier to input)

Sync polarity :positive or negative

Scanning frequency :56-76Hz

The monitor must comply with the Microsoft On Now specification and meet EPA requirement.

Mode	HSYNC	VSYNC	Video	Pwr-cons.	Indication	Rec. time
Power-On	On	On	active	< 28 W Max.	Green LED	--
Power saving	Off	Off	blanked	< 0.8W	Amber LED	< 3 s
DC Power Off			N/A	< 0.5 W	LED Off	

VGA Display identification

In accordance with VESA Display Channel Standard Ver.1.0 and DDC 2B capability

DDC/CI support

In accordance with VESA DDC/CI and MCCS ver.2.0

Data for EDID & INF file

Data for EDID & .inf file

1	User visible strings on .inf file	Philips 160E (16inch WIDE LCD MONITOR 160E1)	
2	Manufacturer ID (EDID data)	PHL	
3	Product ID, "xxxx" 4 codes	MSB(byte 12): C0	
		LSB (byte 11): 2D	
4	maximum resolution	1366x768	
5	Horizontal Frequency Range	30~60 KHz	SI to feedback
6	Vertical Frequency Range	56~76Hz	SI to feedback
7	Monitor Name (13 characters max.)	Philips 160EW	

Hot-key definition

HOT KEY.xls

Any deviation between document and sample, please refer to Philips approved sample.

4. Visual characteristics

Test conditions

Unless otherwise specified, this specification is defined under the following conditions.

(1) Input signal: As defined in 3.3, 1366*768
non-interlaced mode (1366*768@60Hz 85.5MHz), signal sources must have 75 ohm output impedance

(2) Luminance setting: controls to be set to 300 nits with full screen 100 % duty cycle white signal

(3) Warm up: More than 30 minutes after power on with signal supplied.

(4) Ambient light: 400 -- 600 lux

(5) Ambient temperature: 20 ± 5 °C

Brightness

To follow Panel specification

Image size

Actual display size: Refer to **2.1** LCD PANEL spec.

Brightness uniformity

Set contrast at 100% and turn the brightness to get average above 300 nits at centre of the screen. Apply the Fig 1; it should comply with the following formula:

$$\frac{B_min}{B_max} \times 100\% > 75\% \text{ (Follow panel spec)}$$

Where B_max =Maximum brightness

B_min = Minimum brightness

Check Cross talk(s)

Apply Pattern 2. Set contrast and brightness at 100 %. Measure YA. Then output Pattern 3 and measure YB. The cross talk value:

$$\frac{ABS(YA - YB)}{YA} \times 100\% < 1.5\ \%$$

White Color adjustment

There are three factory preset white color 9300K, 6500 and sRGB align by FGA function. Apply full gray 64 pattern, with brightness in 100 % position and the contrast control at 50 % position. The 1931 CIE Chromaticity (color triangle) diagram (x, y) coordinate for the screen center should be:

Product specification

CIE coordinates	(x,y)	
9300K	x = 0.283 ± 0.02 y = 0.297 ± 0.02	PerfectuneII
6500K/sRGB	x = 0.313 ± 0.02 y = 0.329 ± 0.02	PerfectuneII
sRGB	x = 0.313 ± 0.02 y = 0.329 ± 0.02	PerfectuneII

Production alignment spec.

CIE coordinates	(x,y)	
9300K	x = 0.283 ± 0.006 y = 0.297 ± 0.006	PerfectuneII
6500K/sRGB	x = 0.313 ± 0.006 y = 0.329 ± 0.006	PerfectuneII
sRGB	x = 0.313 ± 0.006 y = 0.329 ± 0.006	PerfectuneII

Quality Inspection specification:

CIE coordinates	(x,y)	
9300K	x = 0.283 ± 0.015 y = 0.297 ± 0.015	
6500K/sRGB	x = 0.313 ± 0.015 y = 0.329 ± 0.015	
sRGB	x = 0.313 ± 0.015 y = 0.329 ± 0.015	

5. Mechanical characteristics

Cosmetic

Philips ID

Mechanical data files

ProE files required

Location of Philips Logo

Per Philips make-up sheet

Gap between panel and front bezel

< 1.4mm (Max.)

Location of Control Icons

Per Philips Graphic sheet

Color for resin/paint

Per Philips make-up sheet

Fire enclosure request

Shielding cover should fulfill international standard

Resins

- RoHS required
- WEEE required.
- Resin type/selection refers to Project Book Section 7.2 Plastic material.

If paint is used

- RoHS required
- WEEE require
- If new painting type needs to implement, refer to UN-D 1235.

Plastic mold tooling

- Tooling to be designed to minimize cosmetic defects induced by molding process (sink, blush, weld lines, gate marks, ejector marks, etc.). Refer to “TYV61-90007”.
- Painting to cover up cosmetic defects due to molding is strongly discouraged.
- China RoHS mark requested.

Plastics flammability

- All Plastics to be Flame Retardant UL 94-HB.
- Base / Rear to be Flame Retardant UL 94-HB
- All major plastic parts (bezel, back cover) need to be molded from same resin
- Plastic resin type selection should be referred to “plastic-Philips Pool monitor”

Texture/Glossing of housing

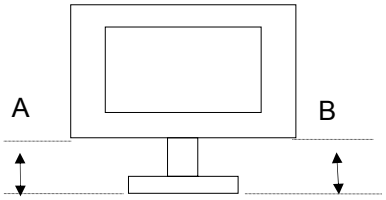
- The texture area and texture no should follow Philips make-up sheet.
- The exterior surfaces shall have a uniform texture.
- Philips must approve the mold texturing.
- Detail document for texture refer to “UN-D249”, “UN-D 600”.
- > = 80 gloss units

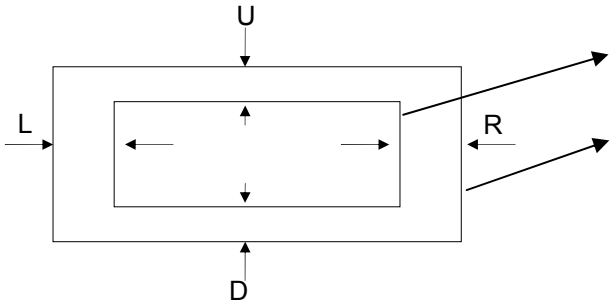
Tilt and swivel base

- Tilt angle : -5 ° +2/- 0 ° (forward)
  +20 °+0/- 2 ° (backward)
- Tilt for left and right:

  ｜A-B｜≤3.0MM

- Black side and cut side：





1. Visual area
   H：｜L-R｜≤0.8~1.0mm
   V：｜U-D｜≤0.8~1.0mm
2. Black side on the left and right is symmetrical, not cut side.

- Gap between bezel and rear cover 0.2 mm (Typ.) Max. will wait for 1st lot of MP to correct the data.
- Step between bezel and rear cover Left, right and top: ≤0.3mm Bottom and corner: ≤0.5mm
- "Wobble", "Twist", etc (front to back or side to side)

Whole monitor set shall retain stability within a short time after the applied external force disappears.

20NT , 6secs（Max.） back to stable.

Kensington Lock

- Must meet Kensington_slot.spec “TYE-M0004”.
- MMD request metal plate in Kensington hole.

Label

- Carton label should follow Philips requirement.
- Regulatory label follow Philips requirement
- China RoHS label
- Detail document refer to Philips Engineering Reference Book

Product dimension / Weight (Refer to Philips approved SHT 191/SHT560)

- Unit dimension : 439(w)*363(H)*191(D)
- Packed unit dimension: :490(w)*375(D)*145(H)
- Net weight : 3.98Kg
- Gross weight : 4.95Kg.

Transportation

Transportation standards refer to UAN-D1534/00/01

transportation packages

Packaging and wrapping shall be sufficient to protect the product against damage or loss during shipment from the supplier to the destination specified in the purchase order. All packaging materials are subject to test and evaluation per TPV standard. The cushion material shall be constructed using EPS material.

Transportation Test

- Package test

1. Random Vibration test
2. Drop test
3. Cold Drop test (for design reference)

- Un-package test

Half sine shock test (non operation)

Pallet / Container loading

Transportation standards refer to TYE-M0002, UAN-D1534 and UAW-0309.

- Air shipment -
- Sea container 20'(pallet/slip sheet)
- Sea container 40'(pallet/slip sheet)
- Sea container 40' High Cube (pallet/slip sheet)
- Land 45‘ Truck and Trailer (800X1200mm pallet)
- Land 45‘ Truck and Trailer (1000X1200mm pallet) for UK
- Truck shipment-

Transportation request for all regions except China/India

A. Air shipment
B. 20’/40’/40’HQ Container loading for WW

Transportation request for China and India

A. Container loading for China and India
B. Truck loading

Transportation request for EU

A. Land 45‘ Truck and Trailer (800X1200mm pallet)

B. Land 45‘ Truck and Trailer (1000X1200mm pallet) for UK (update SHT560)

6. Environmental characteristics

The following sections define the interference and susceptibility condition limits that might occur between external environment and the display device.

Susceptibility of display to external environment

Operating

Temperature	: 0 to 40 degree C
Humidity	: 20~90% max
Altitude	: 0-10000 ft
Air pressure	:600-1100 mBAR

Storage

Temperature	: -20 to 60 degree C
Humidity	: 10~90% max
Altitude	: 0-30000 ft
Air pressure	: 300-1100 mBAR

Note: Recommend at 5 to 35°C, Humidity less than 60 %. Please also refer to DQE requirements.

Transportation tests

Refer to 5.15.2

Display disturbances from external environment

According to IEC 801-2 for ESD disturbances

Display disturbances to external environment

7. Reliability

7.1 Mean Time between Failures

System MTBF (excluding the LCD panel and CCFL): Refer to 2.1 panel MTBF

8. Quality assurance requirements

8.1 Acceptance test

According to MIL-STD-105D	Control II level
AQL:	0.4 (major)
	1.5 (minor)

(Please also refer to annual quality agreement) Customer acceptance criteria: UAW0377/00

9. Philips' Flat Panel Monitors Pixel Defect Policy

Philips' Flat Panel Monitors Pixel Defect Policy

BRIGHT DOT DEFECTS	**ACCEPTABLE LEVEL**
Model	**160E1**
1 lit sub-pixel	3
2 adjacent lit sub-pixels	1
3 adjacent lit sub-pixels (one white pixel)	0
Distance between two bright dot defects*	≧25mm
Bright dot defects within 20 mm circle	0
Total bright dot defects of all type	3

BLACK DOT DEFECTS	**ACCEPTABLE LEVEL**
Model	**160E1**
1 dark sub-pixel	5
2 adjacent dark sub-pixels	2
3 adjacent dark sub-pixels (one white pixel)	0
Distance between two black dot defects*	≧15mm
Black dot defects within 20 mm circle*	1
Total black dot defects of all type	5

TOTAL DOT DEFECTS	**ACCEPTABLE LEVEL**
Model	**160E1**
Total bright or black dot defects of all type	5

* 1 or 2 adjacent sub-pixel defects = 1 dot defect

Fig 1: Measurement locations of Brightness Uniformity

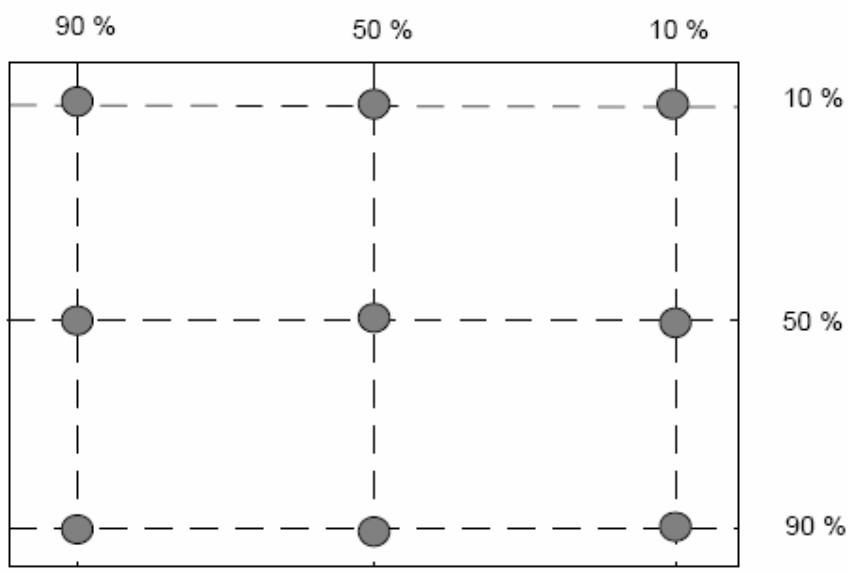


Fig 2: Cross talk pattern Gray level 46 (64 Gray level)

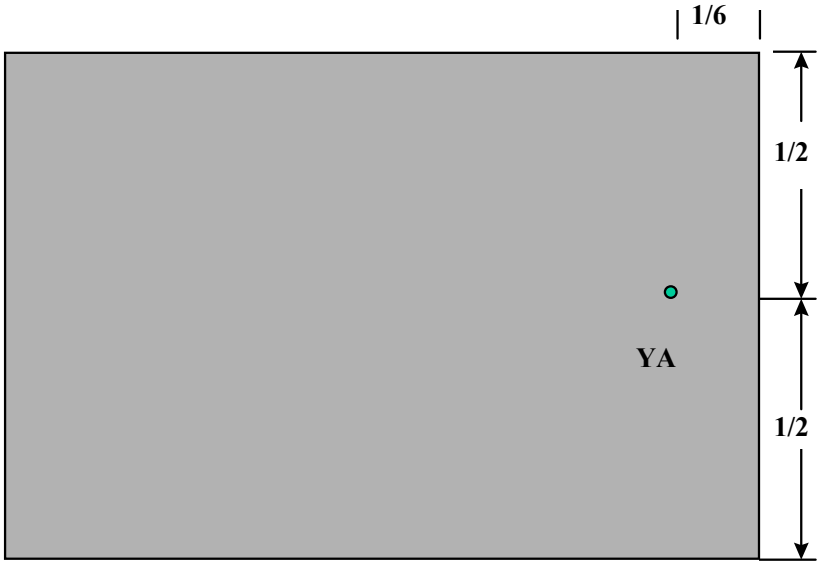
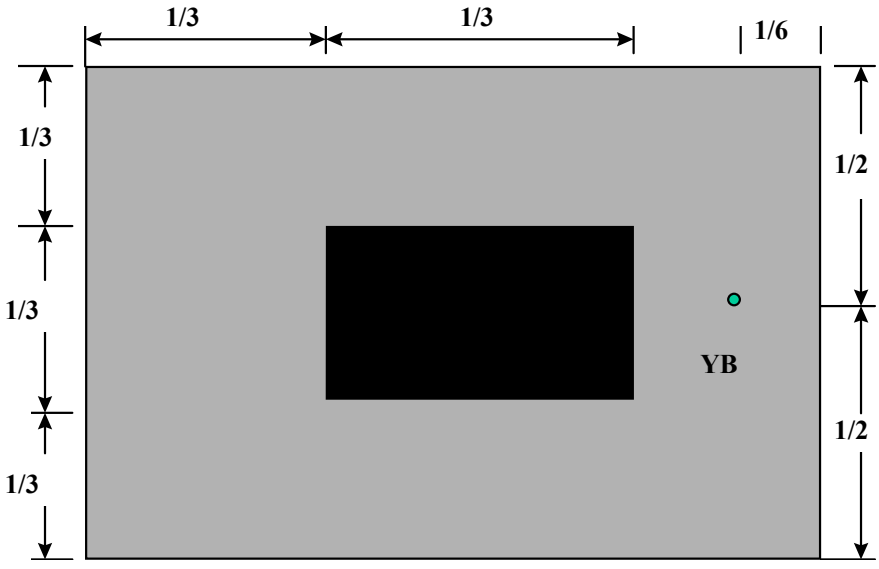


Fig 3: Cross talk Pattern Center at Gray level 0 (Black)



10. REGULATORY COMPLIANCE

Worldwide Regulatory

TYE-A0004 LCD MNT International

EMC Requirements

Supplier DVT EMI test result must be submitted prior to DVT samples delivery, and PVT EMI test result must be submitted again prior to PVT samples delivery which also has to meet Philips' immunity testing specification.

RoHS

Restriction on the use of certain hazardous substances:

Lead, Cadmium, Mercury, Hexavalent Chromium, Polybrominated Bipheny1 (PBB) and Polybrominated Bipheny1 Ether (PBDE)(flame retardant).

WEEE

Producer (Philips) responsible for retailer takes back schemes and recycling.

--System implemented.

--Collection and recycle targets.

Ongoing Regulatory

There's a possibility that other regulatory certificates will be required during the life of the product. It is the responsibility of the supplier to provide related documentation.

TELEVISION/MONITOR SAFFTY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Safety Checks
After the original service problem has been corrected,a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition,which could be unknowingly passed on to your customer. Be sure to check all of the following:

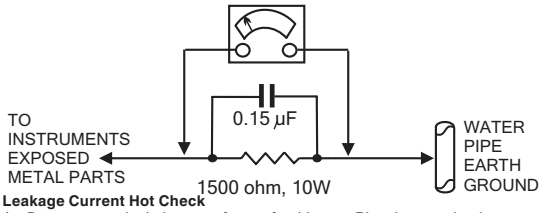
Fire and Shock Hazard
1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those chassis which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barries, covers, strain reliefs, and other hardware have been installed in accordance with the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints,solder splashes,sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord).Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout,lead length, and dress.
5. No lead or component should touch a receiving tube or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with ans by the Ref. No. in the parts list and enclosed within a broken line * (where several critical components are grouped in one area) along with the safety symbols on the schematic diagrams and/or exploded views.
7. When servicing any unit, always use a separate isolation transformer for the chassis Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug.) Defeating this safety feature may create a potential hazard to the service and the user. Extension cords which do not incorporate the polarizing feature should never be used.
9. After reassembly of the unit, always perform an leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also check all metal control shafts(with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit may be safety operated without danger of electrical shock.

* Broken line

Implosion
1. All picture tubes used in current model receivers are equipped with an integral implosion system. Care should always be used, and safety glasses worn,whenever handling any picture tube. Avoid scratching or otherwise damaging the picture tube during installation.
2. Use only replacement tubes specified by the manufacturer.

X-radiation
1. Be sure procedures and instructions to all your service personnel cover the subject of X-radiation. Potential sources of X-rays in TV receivers are the picture tube and the high voltage circuits. The basic precaution which must be exercised is to keep the high voltage at the factory recommended level.
2. To avoid possible exposure to X-radiation and electrical shock, only the manufacturer's specified anode connectors must be used.
3. It is essential that the service technician has an accurate HV meter available at all times. The calibration of this meter should be checked periodically against a reference standard.
4. When the HV circuitry is operating properly there is no possibility of an x-radiation problem. High voltage should always be kept at the manufacturer's rated value-no higher - for optimum performance. Every time a color set is serviced, the brightness should be run up and down while monitoring the HV with a meter to be certain that the HV is regulated correctly and does not exceed the specified value. We suggest that you and your technicians review test procedures so that HV and HV regulation are always checked as a standard servicing procedure, and the reason for this prudent routine is clearly understood by everyone. It is important to use an accurate and reliable HV meter. It is recommended that the HV recorded on each customer's invoice, which will demonstrate a proper concern for the customer's safety.
5. When troubleshooting and making test measurements in a receiver with a problem of excessive high voltage, reduce the line voltage by means of a Variac to bring the HV into acceptable limits while troubleshooting. Do not operate the chassis longer than necessary to locate the cause of the excessive HV.
6. New picture tubes are specifically designed to withstand higher operathng voltages without creating undesirable X-radiation. It is strongly recommended that any shop test fixture which is to be used with the new higher voltage chassis be equipped with one of the new type tubes designed for this service. Addition of a permanently connected HV meter to the shop test fixture is advisable. The CRT types used in these new sets should never be replaced with any other types, as this may result in excessive X-radiation.
7. It is essential to use the specified picture tube to avoid a possible X-diation problem.
8. Most TV receivers contain some type of emergency "Hold Down" circuit to prevent HV from rising to excessive levels in the presence of a failure mode. These various circuits should be understood by all technicians servicing them, especially since many hold down circuits are inoperative as long as the receiver performs normally.

Leakage Current Cold Check
1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check
1. Do not use an isolation transformer for this test. Plug the completely reassembled receiver directly into the ac outlet.
2. Connect a 1.5k, 10w resistor paralleled by a 0.15uf. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5 milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed.(Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

Picture Tube Replacement
The primary source of X-radiation in this television receiver is the picture tube. The picture tube utilized in this chassis is specially constructed to limit X-radiation emissions. For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter, or a Philips approved type.

Parts Replacement
Many electrical and mechanical parts in Philips television sets have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards

WARNING : Before removing the CRT anode cap, turn the unit **OFF** and short the HIGH VOLTAGE to the CRT DAG ground.
SERVICE NOTE : The CRT DAG is not at chassis ground.